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The woodcuts are chiefly engraved by the Messrs. Vizetelly, and are of high quality, although not all according to the latest fashion. It is believed they are more numerous in the present volume than in any other of the same dimensions.

HENRY G. BOHN.

Midsummer, 1859.

THE

YOUNG LADY'S BOOK.

THE CABINET COUNCIL.

SEATED in front of a splendid specimen of the taste of the age of Louis XIV—a gilt and richly inlaid table, covered with a variety of beautiful minerals, shells, and articles of vertù—the Editor, after having been duly announced by Prudence, her bower-woman, found his cousin Penelope, on his entrance into Lady Mary's brilliant boudoir. Lady Mary was standing, attired for a ride, near her fair kinswoman; and Aunt Elinor, the very pearl of the ancient sisterhood of spinsters, entered the apartment before the usual greetings were concluded.

"Your cousin, young ladies," said Aunt Elinor, "wishes to look round Lady Mary's boudoir again, to see if anything has escaped his notice."

This was a very mysterious announcement. Lady Mary, after looking earnestly, first at her aunt, and then at Penelope, as if she were desirous of reading an explanation in their eyes, exclaimed: "Escaped his notice, aunt! I cannot conceive what you mean."

"Why, it would seem, child," was her aunt's reply, "that the arrangement and decorations of your boudoir have, in some degree, attracted his admiration; although, for my own part, to speak candidly—and you know I love you equally—Penelope's seems to me by far the more preferable of the two; indeed, with one or two alterations, it might be pronounced perfect."

"The fault of Penelope's boudoir," said Lady Mary, "is superlative neatness; it looks as prim as herself. Casting a glance round it, your first feeling of admiration at its order is subdued in an instant, by a disagreeable conviction of the pains it must have cost her to drill her little squadrons of embellishment so as to produce such an effect. My dear Pen! you may smile, but you are positively as precise as a mathematician; old Euclid seems to have been schoolmaster to the Graces who preside at your toilet. But, would you believe it?" added the lively Lady Mary, turning to the Editor, "notwithstanding she dresses in drab, and looks demure, Cousin Penelope, I can assure you, is as brilliant as possible on a birth-day; for when she does condescend to be splendid, I must confess, that few, if any of us, eclipse her."

"Yet allow me to remark," said Penelope, "that the rich and profuse negligence which reigns in your boudoir is the result of thrice the toil that I have employed in decorating mine."

"That is true enough, Penelope," said Lady Mary, while a slight blush tinged her cheek; "but the toil you speak of is not apparent. I look upon my boudoir as upon a fine picture in which, those splendid dashes of light, which charm us—those fine touches of brilliant beauty that seem to fall from a mass of foliage to gild the bold edge of a ruin, and finally descend to illumine and ennoble a daisy—appear to have been the work of a moment. And yet," continued Lady Mary, "they are, in fact, produced only by labour, both of the mind and the hand. This apparent carelessness of arrangement has, I admit, cost me considerable pains; but everybody admires the effect, because the art which produced it is concealed. Here, for instance, in this recess, is a beautiful cabinet picture—a charming landscape, partly veiled, but not hidden, by a common, but remarkably elegant creeping plant, which extends far enough round the corner to twine about the carved ebony frame and festoon the polished surface of an old-fashioned glass, which I prize because it was my grandmamma's; here again, you may perceive it wandering downward, and encircling a fossil; on the other side of the window it has attached its tendrils to a tall and stately exotic, and droops from its topmost flower to garland a Greek vase. Now, although this appears to be all the result of pure accident, Penelope, who is smiling at my comparison, will tell you, 'twas I that did it. And do not imagine, I pray, that every-

thing here is in such a chaotic jumble as to be inconvenient; there is, in fact, order in its seeming confusion; I have a clue to the labyrinth, and can find a book or a butterfly in my boudoir quite as soon as Miss Penelope can in hers. Candidly speaking, which do you prefer?"

"To me," replied the Editor, to whom this question was addressed, "they appear to be exquisite specimens of the different styles to which they belong. Like every other boudoir that I have seen (although all bear a faint sort of family resemblance), each is apparently embellished according to the judgment of its fair owner, of whose taste and habits it might be taken as a symbol."

"That is precisely as I think," remarked Penelope.

"Then, my dear," replied Lady Mary, "notwithstanding your reputed wisdom, I must respectfully submit—as I am told the lawyers say, when they contradict the court—that you are partially in error. Of a lady's taste, her boudoir may sometimes, but not always, be a visible criterion. She may possess the taste of one of those select few, on whom Apollo has shaken a dewdrop from his laurel, and yet have as little means of gratifying it as poor Cinderella, before she had a little fairy glass-blower for a shoemaker; she may also be gifted with pure taste in an equal degree, and have a kind Crœsus for a relative to allow her an unlimited account at Coutts', and yet be possessed with a sister sprite to that which nestled in the heart of an Elwes or a Dancer. That a boudoir is not always a proof of the habits of its owner, I positively confess mine to be an instance. Those specimens of minerals are very rare and valuable—at least, so says Penelope—but they never struck me as being beautiful, and she knows I am little more acquainted with Mineralogy, than with the grammar of the Moslems. But to waive the question as to the superiority of Penelope's boudoir to mine, or mine to hers, allow me to ask, why my grave cousin, who sits smiling at our debate, is so anxious that nothing in my pet apartment should escape his notice?"

"I will endeavour to satisfy you on that point," said the Editor. "About two years ago, while seated in this identical chair, I conceived the idea of producing and publishing a work that should be deemed worthy of the acceptance of every young lady in the kingdom."—

"I hope you do not intend to inflict another Annual upon us," said Penelope.

"By no means," replied the Editor; "so far from following the much-beaten track of my predecessors, it is my intention to offer the present-giving public a PERENNIAL—an *evergreen*, that will not be merely looked at and laid aside for ever, but will attract

notice and merit attention at all times and at all seasons. Not such a mere bouquet of flowers as, however rare or beautiful, seldom tempt their warmest admirers to a second inspection, and which are always dethroned, even if they hold their ephemeral sway for a year, by other blossoms, presented by the same hands, at the return of the book-budding season;"—

"But," interrupted Aunt Elinor, with more enthusiasm than usually beamed on her placid countenance, "to drop my nephew's flowery metaphors, a volume which, although rich in beautiful embellishments, shall be so useful and instructive, as well as amusing, that it will, in all probability, be as often in the hands of every young lady of sense who possesses it, ten years hence, as within a month after its publication."

"That is exactly my meaning," said the Editor, looking gratefully towards Aunt Elinor; "and I sincerely trust I shall be fortunate enough to accomplish so desirable an object."

"And pray, cousin," inquired Penelope, "what is the book to contain?"

"If you require a view of the contents," replied the Editor, "I have only to say, look around you! Lady Mary's boudoir would give a very good idea of the volume, and present a capital epitome of a young lady's best pursuits, exercises and recreations. Flora has here a number of living representatives. Gnomes, in bronze, seem to bend beneath the weight of the minerals which are placed upon their shoulders—a sea-maid, with her conch, illumines the apartment when 'Night hath drawn her veil o'er earth and sea'—the insect world is represented by groups of Oriental beetles, and splendid butterflies—the humming-bird is here, with many other of his fellow-tenants of the air, making all around them look dim by the metallic lustre of their plumage. All these remind me of sciences which are applicable to the study of young ladies. I have made a 'brief of it in my note-book,' and introductory papers on Botany, Mineralogy, Conchology, Ornithology, and Entomology, have been the consequence."

"Then there is some probability—as, of course, I shall have the work," said Lady Mary, "that ere long I may know something of two sciences, of which, although they are represented in my boudoir, I am now altogether ignorant."

"One of them I know," said Penelope, "is MINERALOGY; and I must confess, it surprises me that it should never have attracted your favorable notice. If minerals were only to be seen in mines," she continued, "it would be a different case; but they have, for years, been mutely pleading to you in their own behalf—they meet your view on all sides—many of them even in a native state. They contribute essentially to our comfort, and add to our splendour—

they embellish the lofty domes and high places which are the pride of our country, and passively contribute to its defence. They adorn our parlours and our persons—some of them are almost indispensable even to the cottager's wife, while others sit enthroned on the brows of royal beauty, exceeding all beneath 'the Lady Luna and her silvery train' in brilliancy, and equalling the chaplet with which Flora would bedeck herself, in richness and variety of hue; and although they possess not the fragrance of the rose-bud, nor the graceful form of the lily, their durability exalts them to a higher value than that of the most lovely flower that basks in the noontide ray, or blooms in the shade. The snowdrop melts away almost as soon as the white mantle that covers its birth-place—the violet delights our eye in the morning, and is withered by sunset—the queen of flowers endures but for a brief period, and there are few of her subjects hardy enough to bear the scorching glance of a summer sun, and the chill breath of winter. But a diamond endures for ages, and is brilliant and beautiful at all times and in all seasons. The ruby and emerald outlive a thousand generations of roses or evergreens, and gold is the main-spring of human energy and social life."

Lady Mary was rather surprised at the unusual enthusiasm of Penelope. Without, however, waiting to make any remark upon her cousin's poetical style of speaking, she placed her hand upon Penelope's bracelet, and begged to interrupt her oration in favour of the mineral world for a few moments, by offering a short plea on behalf of the subjects of Flora.

"You must, I am sure," said she, "however warmly you may be attached to your pet science, allow that flowers have one great advantage over minerals—the latter are dead, but flowers live. We can sow their seeds, and watch them breaking through the earth, and rear them into beauty and perfection. We have sympathies in their favour—they languish beneath intense heat, and are chilled by the cold easterly blast; they flourish for a time, and then fade away like ourselves. But the germ dies not; its duration, for aught we know, may reach to the extent of time. Some may admire the diamond for its beauty, and others covet it for its value; but it has never that pure hold on our affections which the flower we nourish possesses. Besides, there are thousands of delightful accociations connected with flowers and shrubs. The imagination of the painter, or the poet, never conceived a more exquisite picture of beauty than the dove of the ark gliding towards Ararat with the olive-branch, over the still, solitary, measureless surface of the waters, gazing down upon its own shadow, and listening to the music made by its own wings. Lectures on history, manners, or even mythology, might be given with no text

but a leaf or a flower. With a white and red rose before him, the historian might comment upon the old English wars between the houses of York and Lancaster. A bouquet of Eastern flowers would recal to the traveller's memory some dark-eyed maiden of Persia, whom he had seen committing to the charge of a messenger pigeon a billet composed of buds—the accepted symbols, in her father-land, of hope, joy, grief, reproach, or affection; and a blade of grass might afford an instructive lesson on its transmutation into that important cereal wheat, which naturalists have lately shown to be a gradual development of the Sicilian weed, *Ægilops ovata.*"

"What you have said is very true, Lady Mary," replied her cousin; "but the mineral has also its associations; it possesses a greater individuality of interest, in this respect, than the flower. You may show me a rose of the same species as those worn by the princely Plantagenets, but it is not the same rose. The flower perishes before the hand that gathers it is cold; bnt the mineral's duration affords scope for the imagination to roam as far as the border-land of the probable and the possible. The wise may smile at me for indulging the feeling, or making the confession, but I have often detected something akin to awe creeping over me when gazing upon a gem: it may have sparkled on the arm of Cleopatra, as she sailed down the Cydnus; or enriched the crown of Semiramis, or the girdle of a Ptolemy; or been worn by the Theban mummy that was embalmed three thousand years ago, and after that immensity of time, is brought to be gazed and wondered at by those who have been, comparatively speaking, but just ushered into life. It may be, I have thought, when looking at an amethyst, that thou wert once contemplated by Pliny, and wilt be looked upon, a thousand years hence, by some one abiding in what are now the wilds of the New World, but then the heart of a populous city, and the mistress of the earth, with feelings precisely similar to my own! And what a harvest of rich recollections may be gathered from the sight of a suite of family diamonds! At how many birth-days have they been admired! How many brows have they adorned! The hoops and furbelows with which they were once accompanied; the myriads of fashion—nay, whole generations of their wearers—have passed away, and are forgotten; their names are only found on musty parchments, pedigrees, or monuments; but the diamonds are the same; brilliant as ever, they mock their transient wearers by their durability—sparkling on the bosom of the Lady Jane of to-day, as they will, in all probability, sparkle on the brow, the wrist, or the zone, of some equally young and admired Lady Jane many centuries hence."

"Why, Pen!" said Lady Mary, staring at her cousin, "I never

heard you talk at this rate, and in this style, before. What has possessed you?"

"Simply a desire to make a fellow-student. I have merely adopted your own manner, because I thought it would be more likely to attract you, than the usual plain level of my discourse."

"The other science," said the Editor, "to which, I imagine, Lady Mary alluded, is ORNITHOLOGY. It is certainly my intention to admit the class-mates of the humming-bird, with those of the nautilus, the butterfly, the emerald, and the rose. The mineral and vegetable kingdoms have each been so finely advocated, that it would be superfluous in me to utter a sentence in their favour. You are both, I know, very much attached to Conchology and Entomology. The degree of eloquence either of you might display, in defence of those sciences, may be easily imagined, on considering for a moment the fertility of the theme. There is a fine halo of poetry in the imagination, round the conch, the nautilus, and the pearl, as well as the lily and the amethyst; and it cannot be denied that the insect world is endowed with as much, and even more beauty and interest than either the rose or the diamond. If Lady Mary ground her strongest plea in favour of flowers on their vitality, how much more powerfully may we, on the same score, advocate the cause of the butterfly! There is nothing so admirable in the operations of nature, 'within the bourne of Flora's reign,' as the metamorphosis of an insect—its gradual development and advance through various stages of existence, until it emerges from a tomb constructed by itself, endowed for the first time with the means of soaring in the air. And what can the mineral or vegetable kingdoms afford so attractive to the inquiring mind, as the singular habits and instincts of many insects, and of several of the animals, which, like 'the hermits of fairy-land, abide in pearly grottoes on the shores of Oceanus?'—But notwithstanding the potent claims on our attention of the insect, the shell, the mineral, and the flower, it is a matter of doubt whether either of them be more worthy of our investigation than birds. The forms of an immense number of birds are remarkably graceful; the plumage of many exhibits tints as rich, brilliant, and diversified, as can be found in the entire range of animated nature; their structure is various, and, in all cases, admirably well adapted to their wants and habits. Their utility to mankind is obvious: they afford us articles of ornament as well as of use: the plume of the ostrich is associated, at the toilet, with the flower, the gem, the pearl, and the produce of the silkworm; to neither of which are we indebted for such important benefits as have been afforded us by the quill of thegoose. The nidification of many birds is quite as ingenious as that of insects; their migrations have attracted

the notice of philosophers for ages past; and their familiarity in a domestic state, and the affection they display towards their nestlings, elevate them, as objects of human interest, above all the other classes of creation which we have noticed."

"Your remarks," said Aunt Elinor, "appear to me to be very correct; and you act discreetly in suffering Ornithology to occupy a niche by the side of its sister sciences. Thus far would I go, but no farther."

"But you do not, I trust, mean to restrict yourself to the sciences, however interesting and important they may be," said Lady Mary.

"Certainly not," replied the Editor; "I have taken hints of your occupations from the escritoire which adorns your table; and the drawings, by your own hand, which bedeck the walls. This rich piece of ancient tapestry, which is so beautiful, that one might imagine its pattern was designed by Raphael himself, who did not deem his magic pencil disgraced by drawing for the noble embroideress of olden times; and yonder specimen of beautiful lace, executed, perhaps, by the hands of the inventress of the art, Barbara Uttmann, the celebrated maiden of Saxony, have also afforded me valuable ideas. Believe me, I have not overlooked that excellent bust of Mozart, and the harp, which stands in yonder recess; nor the old-fashioned mirror, a relique, doubtless, of some celebrated beauty, in the days of hoops and high-heeled shoes, and which has reminded me of the importance of the Toilet."

"Well, cousin, I positively begin to feel much interested in your book," said Lady Mary; "and if you will deign to accept a compliment from one so much younger than yourself, I admire your discrimination. But do not forget our exercises, I beseech you! Remember, I had a fine cast from Canova's statue of Terpsichore, although, much to my regret, it has lately met with an accident."

"Dancing will, decidedly, have a place in the volume," said the Editor; "the work would be very incomplete without it."

"My cousin's Ascham,—her bow and quiver,—have also, I hope," observed Penelope, "been favoured with your notice."

"Archery, when I was young," said Aunt Elinor, "was never thought of as a feminine recreation; but I admit that it is now very generally patronised; and having, as an exercise for the young, received the sanction of ladies, whose age and character entitle them to the utmost respect—(Aunt Elinor spoke this with most significant emphasis),—I am bound to approve of it."

"And Riding," added Lady Mary, "certainly must not be omitted. My whip, I am satisfied, has not escaped your glance;

and my aunt, I will venture to say, highly approves of riding on horseback."

"It is, unquestionably, beneficial in many respects," said Aunt Elinor; but still it must be considered, as a graceful exercise, very inferior to Dancing."

"It seems then to be decidedly your opinion, ladies, that Archery, Riding, and Dancing, are very proper exercises."

"Unquestionably so," said Aunt Elinor; "and I may add, that in these, the only unobjectionable parts of the new science, denominated Calisthenics, will be found in their greatest perfection."

"The young ladies, I am happy to say," observed the Editor, "appear by their looks most cordially to agree with you. I have, Aunt Elinor, as you know, taken counsel on the subjects with which the volume is to be occupied, of the most intelligent and respectable ladies, in every intermediate degree of age, from grave matrons to girls of fifteen; and I flatter myself, that I have obtained much benefit from their hints, and shall succeed in pleasing them all. I intend not only to include all the subjects of which we have been discoursing, but several others equally attractive and important, with which I hope agreeably to surprise you. That I have not consulted my fair young cousins before, is not because I did not entertain that respect for their opinions which they deserve; but rather from a desire to submit the whole to them in a tolerably mature state, so that I might obtain the benefit of their suggestions for its ultimate polish. It is gratifying to find, that those, whose judgment I respect, and who belong to that class whom I am anxious to please, approve of my forthcoming production; for in such a case as this, to make use of the words of an old author, 'it is useless to please the dowager, unless our work delighteth the damsel.' Innumerable difficulties presented themselves to the perfect execution of my ideas on the subject: you will, of course, imagine that is was an impossible task for an individual."

"That I can readily conceive," said Lady Mary; "but in these days, when the press teems with new publications, there surely can no dearth of authors."

"Authors—mere authors—and even persons of great talent," replied the Editor, "'are thick as the leaves in Vallombrosa.' Nothing is more easy than to get up a volume of papers, by first-rate hands, consisting of passable poetry, amusing or pathetic tales, and excellent essays on men and manners; because an immense number of coadjutors may be found: but those, who have anything valuable to communicate in any of the departments of art and science, are few; and but a small portion of these few, however highly gifted and experienced, have the power

of communicating their acquirements by means of the press. Even to those, who are practised in the art of composition, the difficulty of describing any practical operation is almost beyond belief. Hence, the worth of a page from a scientific writer is considerably enhanced. To discover persons of science, or practical experience, who were at once willing and able to write on subjects calculated for such a work, has, therefore, been a much more arduous task than could be easily imagined. Individuals of the greatest eminence, have, however, been successfully sought out, and induced to contribute their assistance; and as each has written only on that art or science which he or she professes, there is every reason to hope, that success has crowned the efforts which have been made to render every page instructive and valuable."

"I think there can be little doubt on that point," said Aunt Elinor; "but you have omitted to remark, that acting upon the suggestions of myself, and two or three estimable persons of my acquaintance, you intend to offer your young readers a brief but impressive chapter, by an experienced lady, on the important subject of MORAL DEPORTMENT."

"It had not escaped my memory, I assure you, Aunt Elinor," said the Editor, "neither have I forgotten (to descend from a very high to a comparatively trivial subject) the fabrication of those elegant articles, denominated by Lord Normanby NICK-NACKERIES, which are so profusely scattered around me. To readers who are a few years younger than my cousin, I feel satisfied that the pages which I shall appropriate to the mode of constructing various elegant and useful ornaments of the toilet and the boudoir, will be decidedly interesting."

"And even to those of our own age also," said Lady Mary, "if you take Penelope's opinion. The ingenious productions you allude to are of her own manufacture, and the best of them, lately completed, are about to be presented to a fancy fair, got up by the gentry of our neighbourhood for a charitable purpose. She has the presumption to say, that working in pasteboard is a familiar and practical illustration of the principles of geometry."

"And with great propriety, rather than presumption, as I should say," observed Aunt Elinor.

"In truth, I am almost inclined to agree with you, aunt; but before you conclude your visit, cousin," said Lady Mary, as the Editor rose from his seat, "allow me to say, that both Penelope and myself are conscious of the compliment you have paid us, and we must make a suitable return. I remember being present, some years ago, at the ceremony of launching a frigate; she was called, I think, the Arethusa; and my sister had the honour of

naming her, which she did in very delicate terms, while a bottle of wine was thrown at the fair Arethusa's head! From this circumstance I take my hint; and if you will bring the manuscript of your book, neatly written on gilt-edged and wire-wove paper, and beautifully bound, Penelope shall name it, while I sprinkle its title-page with eau-de-mille-fleurs."

"But what name shall I confer upon it?" inquired Penelope.

"As it is to be a book exclusively devoted to young ladies," said Lady Mary, "let us resist all euphonious temptations, of which I confess the very nature of the work presents an abundance, and give it the plain but comprehensive title of 'THE YOUNG LADY'S BOOK.'"

"Your suggestion shall be adopted," said the Editor; "and be assured, that I will endeavour to render it worthy of its name. And now, ladies, I shall assume my editorial mask; and with the Graces for my lady-ushers, proceed at once to hold a Court of Art, Science, and Recreation."

L'Ouverture.

Here, in this classic bower—the Muses' home—
Fair Science sits upon a throne empearl'd;
And at the waving of her wand, a Gnome
Reveals the treasures of the mineral world.

Her silver bow Latona's daughter bends;
Young Music, heav'nly maid! assumes the lyre;
Terpsichore her glad assistance lends;
And Painting's charms the youthful soul inspire.

Here, Flora reasons on a budding rose;
Lorn Philomel a learned treatise sings;
While purple moths their graceful forms disclose,
With lectures woven on their gorgeous wings.

Minerva and the Graces here display
The charms of taste with wisdom's lore combin'd;
And willing Sylphs their various arts essay,
To raise, improve, and gratify the mind.

MORAL DEPORTMENT.

Oft in the pleasant villages of France,
Some high-born lady crowns the rustic maid
With floral emblems of her modest worth.

ENTAL improvement should always be made conducive to moral advancement; to render a young lady wise and good, to prepare her mind for the duties and trials of life, is the great purpose of education. Accomplishments, however desirable or attractive, must always be considered as secondary objects, when compared with those virtues which form the character, and influence the power, of woman in society. Home has justly been called "her empire;" and it is certain that to her it is a hallowed circle, in which she may diffuse the greatest earthly happiness, or inflict the most positive misery; it is never so narrow but from thence may stream many a benignant ray to illumine a neighbour's dwelling, and it may be wide enough to give light to thousands. The virtues of a woman of rank and fortune extend far beyond the mansion where she presides, or the cottage which she protects, by the example she offers to those around her and below her. Gently, imperceptibly, but most certainly, will she imbue with her own purity and beneficence the atmosphere in which she moves; softening the obdurate, correcting the depraved, and en-

couraging the timid. Those who are not placed by Providence in so brilliant a sphere, may, by their conduct, produce the same effects, in a more limited circle and in a less degree, but with equal honour and satisfaction to themselves.

The virtues of the heart must be cultivated not less than the acquirements of the mind, or we shall look in vain for the fruit we desire; nor must we expect early youth to exhibit those flowers which only experience can supply, or labour attain; but as it is certain, that knowledge and virtue may, and generally do, grow up together, so we may earnestly entreat the young to give to this subject their most anxious attention.

In examining their own conduct, analysing motives and correcting errors, repressing those faults to which they know that they are prone, and resolving to cultivate virtues in which they have proved themselves defective—females, at all ages, are, it is evident, exceedingly well employed, but more especially so at that happy season of life, when prejudice and habits have taken no deep root; when passions are generally easy of control, and the sensibilities and affections of the heart, with all its better impulses, are awakened to aid us in the task.

Such is the bias of our natural dispositions toward some particular modification of good or evil, that it is a difficult task so to offer advice in the management of temper and inclination, to girls in general, as to bring it home to the feelings of any particular individual. There is no occasion to recommend gentleness to the timid, nor courage to the bold; to inspire the ambitious with emulation, or recommend ingenuousness to the open and sincere; we, nevertheless, will venture to lay before our young readers what may be termed a list of virtues, not one of which can be dispensed with in the female character, since all will, unquestionably, be called for, at one period or other, in their path through life, as a means of security to themselves and of benefit to others.

Piety, integrity, fortitude, charity, obedience, consideration, sincerity, prudence, activity, and cheerfulness, with the amiable qualities which arise from them, may, we presume, nearly define those moral properties called for in the daily conduct and habitual deportment of young ladies. On each of these I beg to dilate a little, not merely for the purpose of explaining what will be self-evident to every reflecting mind; but also to impress on the memory facts too frequently forgotten in the press of multifarious engagements. I would do more; I would address myself earnestly to the heart of every one who casts her eye over these pages, intreating her to consider their importance to herself, and to all whom she loves.

Piety includes faith, devotion, resignation, and that love and

gratitude to God, which stimulates us to inquire his will, and perform it, so far as the weakness and imperfection of our nature permit. It offers the best foundation, not only for solid happiness, but for that serenity of temper, and disposition to innocent gaiety, which is at once the charm and the privilege of youth. No idea can be more fallacious than the supposition that the refined and rational pleasures of society are incompatible with those acts of devotion, and that occasional abstraction of the mind from worldly pursuits, practised by every well-conducted person. The lofty aspirations, the deep humility, and unshrinking confidence of a Christian, in those moments when the soul may be said to commune with her God, can have no other effect than that of adding sweetness to the common incidents of life. It increases the endearing relations between parent and child, the fond affection of the sister, the kindness of the friend, and the tender forbearance of the superior, by a perpetual sense of the abiding presence of Him, from whom we have received all blessings, and by whom we are exercised in the trials of this life; and it extends our sympathy to the whole human race.

Integrity is a virtue of great extent; it includes rectitude of intention, honesty of action, abhorrence of all deceit, and a sense of justice sufficiently strong to prevent us from injuring our fellow-creatures, not only in word or deed, but even in thought. The world is extremely deficient in that common honesty, which every one would blush to have doubted in herself; therefore, it well becomes young people to examine their claims in this respect, and determinately to subdue in themselves all propensities which militate against their own sense of uprightness. They should remember, that all extravagance has a direct tendency to evil, and has rendered more persons unjust than any other failing. It is one of the most pernicious branches of selfishness, which always seeks to appropriate that which it desires, without considering the claims of another; whereas, a generous and noble spirit would renounce its own wishes for another's good; and a simply honest mind would, at least, scrupulously weigh its own rights, lest it should encroach on another's. It is the more necessary to gain proper ideas on this subject, because the farther you advance in life, the more you will be tried.

Fortitude, like Integrity, may be termed one of the severer virtues; but it is not the less necessary for the weaker sex, since, with comparatively little physical strength, and few opportunities of improving it, either mentally or corporeally, woman is yet called upon to exert great powers of endurance, both actively and passively. The pains of sickness, the misfortunes of life, the afflictions of calumny, call upon her for patience under suffering, firmness, reso-

lution, and perseverance; without these qualities, a woman, however engaging or attractive, will generally be found deficient in all the nearer relationships of life, and incapable of fulfilling its most important duties.

Charity. The sweet exercise of this virtue seems so congenial to the nature of youth, that I would rather seek to regulate its impulses, than recommend it to an attention, I trust, already attained. A young lady, rich in the possession of friends and fortune, who is devoid of pity, and incapable of the offices of humanity, is an anomaly in creation. To this fair miser—this scentless flower, which shall blossom without esteem, and fall without regret,—I offer no advice; but to the generous, tender, and kind-hearted girl, whose wishes run beyond her means, to the scrupulous and prudent, who fears lest she should commit an error while she indulges a virtuous inclination, I would suggest a few admonitions.

Whether you are the mistress of a regular allowance, or the proprietor of casual sums, never fail to appropriate some portion of your pocket-money to a charity-purse. Economy is the handmaid of Charity; without her aid, the melting heart and the tearful eye are of no avail, therefore never despise her assistance, even in trifles; but as cases will sometimes occur for larger help than your charity-purse can supply, you may then encroach, without blame, upon your general store; in such cases, make up the deficiency by some act of self denial, for regularity is as necessary a duty as charity is an agreeable one.

Do not forget that Charity has a much wider signification than alms-giving. Affability of manners, gentleness of demeanour, attention to the courtesies of life, compassion towards all who suffer, whether high or low, a kind construction of the words and actions of our fellow-creatures, and patient forbearance, or generous forgiveness, towards those who have grieved or injured us—are also demanded by this virtue. "Charity suffereth long and is kind, charity envieth not, charity vaunteth not itself," —is the language of that Apostle who best understood its nature, and has so touchingly concentrated its qualities.

Obedience is so much demanded in the female character, that many persons have conceived it was the one virtue called for in woman, as it must be deemed by all to be such in a child. If man, as the guide and head of woman, were himself a perfect creature, this would, unquestionably, be true; but as a being accountable to her Creator, and endowed by him with reason, unqualified and implicit obedience to a creature like herself, liable to many errors, cannot, consistently, be required. It is, however, certain, that in whatever situation of life a woman is placed, from

her cradle to her grave, a spirit of obedience and submission, pliability of temper, and humility of mind, are required from her; and the most highly-gifted cannot quit the path thus pointed out by habit, nature, and religion, without injury to her own character. Modesty, which may be termed the inherent virtue and native grace of woman—which she may be exhorted to retain, but will seldom be entreated to acquire—renders obedience, in general, easy and habitual to her, especially at that period of life, when she is placed under paternal care. There are, however, gay and buoyant spirits, haughty and self-willed minds, even among the softer sex, that are not otherwise ill-disposed, who feel obedience a difficult task, and are ready to question the wisdom, or analyse the rights, of those in authority over them. To such I would urge this virtue as a religious duty, if they could not submit to it as a reasonable service. I would beseech them, as females called to self-control and meekness, to obey, "for conscience' sake," even where conscience itself did not utter the command, "hitherto shalt thou go, but no further."

Consideration is of the utmost value in that situation where the conduct of woman has its greatest utility and most valuable influence—the domestic circle. It combines the powers of reflection, with the sentiments of kindness, and saves from many an anxious hour, and wearisome labour, the parent who thinks for you, the teacher who instructs you, the servant who toils for you. It is a gentle and feminine virtue, unobtrusive as to appearance, but important in effect. The threatenings of incipient disease—the ruin caused by foolish expenditure, or idle speculation—the temptations which might have misled an ignorant servant, or imprudent friend—the present aid that may save a wretched family—may all be happily prevented or supplied by Consideration. It is the "still, small voice," which can allay the tempest, or direct the tide of human affairs, by an agency alike mild and beneficial, powerful and unassuming.

Sincerity has been hailed by the poet as the "first of virtues;" and happily it is, like modesty, a pretty general one with the young and artless, who cannot have so mixed with the world as to have learned deceit. Children are seldom disingenuous, but in some, extreme timidity produces this effect; the want of courage to own their faults, or reveal their wishes, leads them to use cunning in veiling the one, and procuring the other. Such a tendency calls for no little care from the instructor; and if her efforts have not wholly succeeded in clearing the soil, let the young lady herself seek diligently to recover her own esteem, by struggling against everything in her bosom the least allied to concealment or duplicity. Sincerity is so nearly allied to Integrity,

that they can scarcely exist asunder. The love of truth and the practice of fair dealing go hand in hand; and whilst we regard them as virtues, lovely in their simplicity, we venerate them as the majestic foundation on which a beautiful structure shall hereafter be erected. But whilst I earnestly entreat one class of young ladies to cultivate sincerity, as well as gentleness—ingenuousness, as well as meekness—I cannot dismiss the subject without advice to those frank and open-hearted girls, who are not liable to the sin of deceit, but who, in their scorn of flattery, and profession of extraordinary freedom, are liable to mistake rudeness for sincerity. To be blunt in reply, quick in censure, and severe in remonstrance, is not only unfeminine, unladylike, and at every age reprehensible, but ought to be particularly avoided by the young; because they cannot possibly hope to be of any utility to their fellow-creatures, by affecting the character of reprovers. To them, more particularly, may the advice of our Lord apply: "Judge not, that ye be not judged;" for seldom are they aware how much the pride of their own hearts, and the irritation of their own tempers, may mingle with their admonitions. They may be assured, that their equals in age will not suppose them wise enough to direct; and, to their seniors, over-forwardness must, unquestionably, seem presumption. There may, undoubtedly, arise in early life, and especially in female life, occasions when

> The grave rebuke,
> Severe in youthful majesty,

may be uttered from young lips, and glanced from young eyes, so as to prove effectual advocates for religion and virtue; but beneficial effects, of this description, are not often found to arise from those who pique themselves upon plain speaking. Such persons lose the power of delicate reproof, or decisive disapprobation, on the extraordinary occasions which may occur, by wasting their energies on trivial subjects, and evincing a determination to speak their hastily-formed opinions, at the expense of humility, charity, and patience. Let us never forget, my dear young friends, that "a mild answer turneth away wrath;" and that the same Divine Word which bade many "resist unto death" for a great cause, bade its followers, also, "be affable and courteous."

Prudence may be termed rather a quality than a virtue; but it is so necessary for all the purposes of life, that an imprudent person seldom escapes the imputation of some vice, and the infliction of much unnecessary sorrow. The generosity and ardour of youth too frequently lead young people to consider the lessons of prudence as allied to mistrust, fastidiousness, or avarice; but they are by no means necessarily so, though it is possible for

them thus to degenerate in peculiar dispositions. Sincerity is perfectly compatible with true politeness; and Prudence, with generosity, confidence, and friendship. Every young lady, who thinks before she acts, will easily see the path which Prudence dictates, and rarely find that it demands any other sacrifice than those required by positive duty.

In conversation young ladies should avoid flippancy and sarcasm. An ingenious or witty stroke of satire, however goodnaturedly meant, may pain, and perhaps lose a friend. Unrestrained quizzing and joking is certain to make a young lady the terror of her acquaintances, however little she may at first perceive it. On general topics of conversation, a very good rule is, "converse always with your female friends, as if a gentleman were of the party, and with young men, as if your female companions were present."

Activity and Cheerfulness may be linked together, for the former is frequently the cause of the latter; and both are demanded in early life, as the flowers of spring, which give beauty and gladness to the earth for the present, whilst they promise the harvest which will enrich us at a future hour. Indolence of habit creates gloominess of manner and acerbity in temper, and induces those diseases which create and increase the evil, and prove more injurious to the character and the person than sickness itself. We have all seen amiable but afflicted young people, who have endured confinement with cheerfulness,—pain with fortitude; and, from motives of affection to their parents and friends, preserved a portion of their youthful sprightliness and energy, through days of weariness and nights of suffering; but in the listless apathy of idleness, and the langour of indifference, every virtue perishes, and every talent fades. Far better is it to have too much enthusiasm, buoyancy, and energy, in youth, than too little; for experience, care, and knowledge, will correct the redundancy; but it is, indeed, difficult to excite the cold-hearted to exertion, or woo the inert and stupid to the cultivation of taste and intellect. She who has, from a sense of duty, and the force of good principles, conquered this lethargy of the mind, is entitled to the highest praise, and her future activity and cheerfulness may, indeed, be ranked in the list of virtues.

In every family, from the highest to the humblest situation, there is a necessity for active services on the part of the young ladies, too evident to require enumeration. So soon as the cares of education are over, every mother has a right to expect from her daughter such attention to the domestic arrangements, the younger branches of the family, and the entertainment of visitants, as may lighten her own burden, and impart to her the delightful satisfac-

tion of finding a friend and companion in that beloved being, for whose welfare she has been so long solicitous. Such occupation need not, by any means, interfere with the elegant pursuits, or the common amusements of social life, if early rising be adopted; for two hours in the morning are more valuable than four at any later period, when the routine of family engagements is entered upon. It has the additional merit, to an active and modest girl, of rendering her pursuits private. Last summer I was a visitor for several weeks in a gentleman's family, without discerning that the blooming girls I met at breakfast had been preparing their little brothers for their classical lessons, instructing a younger sister in music, and settling that provision for the day, demanded by a numerous establishment; but I now know that these meritorious and truly endearing services are performed by them with not less vigilance, even during their abode in London, amid the gaieties of the season.

That much more might have been said, will be evident to all who duly weigh the subject; but I would not weary those whom I desire to benefit. A writer, who has for many years conscientiously endeavoured to supply to the young those lessons they greatly need, in the form they constantly desire, has a right to be considered a personal friend, since they are familiarly acquainted with her principles, feelings, thoughts, and wishes. As such, affectionately and earnestly I request their attention to subjects so deeply interesting, and so immediately connected with their best interests.

THE FLORIST

THE FLORIST.

Proserpine, gathering flowers,
Herself a fairer flower, by gloomy Dis
Was gathered.

VARIOUS are the notions entertained relative to Botany. Many conceive it to be a mere dry study of the forms of plants, and that a botanist minutely examines every portion of a plant, and turns over various systematic volumes only to ascertain its name; which having discovered, he is satisfied. Judging by this false estimate, they pronounce Botany to be insipid and of little use; a sort of grave and dreary idling. Let those who thus decide upon its merits, first inquire what they really are. Botany is not a mere knowledge of the names of plants, and of the mode of ascertaining those names by a reference to the classes, orders, genera, divisions, or families, of a system, artificial or natural: this is but the alphabet of Botany; which, having learned, the botanist begins to inquire into the internal construction of plants, their affinities, and their differences, and by what means they live, and receive nourishment; hence he learns the soil and mode of cultivation best adapted for each, the uses to which they may be applied, and the evils, as in the case of poisonous plants, which may be prevented. He inquires where a plant is indigenous, that is, what country produces it in a wild state; for what purpose it is used by the natives; and whether another, botanically related to it, might not

be applied to the same use in the country to which such other belongs. It has not unfrequently happened, that plants have been imported at great expense from foreign countries, which have afterwards been discovered to be indigenous in our own. It must be acknowledged, that some plants have entirely lost their nominal value by growing near home; but in such cases the fault lies not with the botanist, but with those who value things in proportion to the trouble and money expended in their attainment. The Golden-rod (*Solidago Virgaurea*, fig. 1), a coarse autumnal plant, with yellow flowers, was formerly considered an excellent vulnerary; and our ancestors imported it at half-a-crown an ounce. "But since it was found growing wild in Hampstead wood," says Gerard, "no man will give half-a-crown for a hundred weight of it." Not to dwell longer upon the utility of the science, of which, however, very much might be said, it is infinitely agreeable; and the reader may, with little difficulty, call to mind many anecdotes and pleasing associations with plants, which will endow them with considerable interest. In Mythology, many flowers and plants hold eminent stations. The histories of Narcissus, Hyacynth, Clytia, Daphne, &c., have often been the "poet's theme." Daphne, we are told by Ovid, was changed into a Laurel—the true poetic Laurel (*Laurus nobilis*), which is said to resist the lightning. Clytia was metamorphosed into that sweet flower, the Peruvian Heliotrope, which formerly bore her name. The word Heliotrope signifies a follower of the sun, as Helianthus does the Sunflower.


1

Golden Rod.

The close examination necessary to discover the genus and species of a plant, makes us acquainted with many beauties concealed from general observation, either by their situation or their minuteness. We have not only an endless variety before our eyes, but are continually struck with the purpose and foresight displayed in apparently trifling peculiarities. We are always learning something new, and the knowledge we thus acquire is such as calls forth our admiration and gratitude; and while it gives that conscious power, which all knowledge, more or less, bestows, it awakens a sense of humility, by a comparison, which cannot fail to occur to us, between our own powers and the simplest works of Nature. We cannot pursue knowledge of any kind, without enlarging our views, as well as acquiring new ideas; and Botany has the great advantage of ameliorating the disposition, while it elevates the mind.

Even those who do not study plants botanically, may find pleasure in rearing and attending to them, that is horticulture,

which is as elegant and interesting a pursuit as any to which a young lady can devote her leisure. A love of the beauties of nature, whether in general or in detail, is always amiable; and there is something peculiarly adapted to feminine tenderness in the care of flowers. Do not mistake me, fair reader, I beseech you; I would not be understood to insinuate, that no one is amiable who does not love to rear flowers. One young lady may be indifferent to them, from having seen but little of their beauties; another from having seen too much. Yes, I can conceive a possibility, that being constantly surrounded by a variety of fine flowers—in the garden, the greenhouse, and every part of the dwelling-house—which are tended and watered by labouring gardeners or servants, and of which she knows not, perhaps, half-a-dozen even by name—may render a young lady careless and altogether indifferent about them; who, under other circumstances, would have shown a taste for their beauties, and an inclination for their culture.

Should a young lady profess a total disregard of flowers, I should yet be unwilling to admit that she was incapable of feeling their sweet influence, though circumstances might have rendered her insensible to them; and should be inclined to propose to her a few questions, by way of ascertaining the cause of so (as it would seem to me) unfeminine an insensibility. I would ask her, if she had ever, during her infancy or childhood, been permitted to run, sit, walk, or gather wild flowers, in the green meadows? If she had ever waded, breast high, in the long grass, to gather Buttercups and Sorrel? If she had ever filled her frock with Daisies—priding herself in finding the reddest-lipped? If she had ever pelted her young companions with balls, made on the instant, with fresh-gathered Cowslips; or slyly adorned them with Cleavers, also called Goose-grass and Whip-tongue (*Galium Aparine*, fig. 2), and laughed to see their vain endeavours to escape from their tenacious hold? If she had indulged in all these sports, and yet loved not these pretty toys of her childhood, I should, indeed, fear that her distaste was a deficiency of taste in general. I should conjecture, that she who had no feeling for the lovely dress and various ornaments in which Nature and the Seasons are attired, would have little relish for the delightful imagery of Spencer; that she who failed to treasure up these early associations of innocent pleasures, would but ill appreciate the human sympathies of Shakespeare. If it should appear that these rural pleasures were wholly unknown to her; that she had been accustomed to enjoy the fresh

2

Cleavers.

air only in the formal progress of a school procession, or a fashionable promenade; that she had only contemplated the general beauty of the country from a carriage-window; then, indeed, I should be disposed to congratulate her on having pleasures in store, which had been denied to her earlier youth, and to exhort her to throw off the trammels of mistaken dignity, and no longer to debar herself from those innocent enjoyments which impartial Nature offers alike to all. I would urge her to seek the shade of the woods, the freshness of the hills, the placid beauty of the valleys, and the flowery banks of the winding river. I would entreat her to enfranchise herself from the thrall of Fashion, and to visit the spacious orchestra of Nature, which, day and night, resounds with music:—

> Shrill through the crystal air the music swims,
> To which the humming bee
> Keeps careless company,
> Flying, solicitous, from flower to flower,
> Tasting each sweet that dwells
> Within their scented bells.

It is not recommended to a young lady to dig up the earth, study the modes of manuring it, or prepare compost: it will suffice for every purpose of health and pleasure, that she can sow the seeds in their fit season; transplant, trim, and train the young plants; give them sun or shade; water, or keep them dry, as their different habits may require; or direct the arrangement of the flower-beds in accordance with the theory of colours. A garden offers many light and graceful occupations to a young lady; as the removal of decayed leaves and flowers; budding, pruning, and tying up Roses; training the Convolvulus, Sweet-pea, or other light climbers, to their frames or lattices; uprooting the lighter weeds; lightening shrubs of superfluous blossoms, or preserving strength to their roots, by removing decayed flowers ere their seed be ripened. Now let us take a turn in the garden, and see what it presents to us.

5

White Lily.

See those beautiful White Lilies (*Lilium candidum*, fig. 3). How elegant their form, how pure their whiteness, how delicate their texture, how majestic their height! This is the flower of Juno; and is, perhaps, the only one that could have saved that jealous goddess from grudging to Venus the possession

> Of the Rose, full-lipp'd and warm.
> Round about whose riper form
> Her slender virgin train are seen
> In their close-fit caps of green.

Some other of the Lilies show well side by side with this white one: for instance, that fine Red Lily, called the Jacobœa (*Amaryllis formosissima*, fig. 4); the Turk's Cap; Tiger Lily; Scarlet Martagon; and the Lilium Lancifolium rubrum. The Lilies are a noble family, and splendid in their attire. We see them glowing in the most dazzling colours, crimson, vermilion, and fire colour; some dappled with gold; all large, rich, and elegant; yet the purity and fragrance of the old White Lily—the Lily of the field of Scripture—makes it a leading favourite, not exceeded even by the White Lancifolium and Japan varieties, now domiciled in our gardens. It is remarkable, that with the exception of these bridal flowers, the Lilies are generally warm-coloured: they affect no pale pinks, blues, or lemon tints, but assume each hue in all its strength and power. The White Lily has some colour, just enough to make it appear the whiter; the six large golden anthers play in the centre like flame in a lamp of alabaster. It has been observed of flowers, that many of the more fragrant are the least handsome; as birds of homeliest plumage are mostly gifted with the sweetest song; but the White Lily has a perfume equal to its beauty. It is an admirable study for a young botanist: the parts are so large and distinct. You may readily count the six stamens, each having a polished white filament, on the extreme point of which trembles the goldon anther, with its sides open, and the pollen within them glittering in the sun. See the six-furrowed germ in the base of the flower, and the three-furrowed style ascending from it, and crowned with the triangular downy stigma; the whole pistil of a pale and delicate green (*Lilium candidum*, fig. 3). The pistil nourishing the young fruit in its bosom, is considered as the mother, and bears a Greek name, *gynia*, signifying wife; while the stamen, which supplies her with food for her young family, is termed *andria*, the husband. This Lily is of the class Hexandria (six stamens), order *Monogynia* (one pistil): a class and order very rich in magnificent flowers, containing Lilies innumerable, the Pine-apple (*Bromelia*), the Snowdrop (*Galanthus nivalis*, *a*, fig. 5), the Narcissus, the Star of Bethlehem (*Ornithogalum umbellatum*, *b*, fig. 5), the Tulip, Amaryllis, Tuberose, Hyacinth, Tradescantia, Agapanthus, Asparagus, the Yucca, Aloe, &c. According to the *Natural arrangement* this class is divided into several distinct

4

The Jacobœa.

5

a *b*

Snowdrop.
Star of Bethlehem.

orders, of which the principal, *Liliaceæ*, comprehends the Lilies, Tulips, Yuccas, &c., while the Amaryllis and Narcissus belong to the *Amaryllideæ*, the Star of Bethlehem and Asparagus belong to the *Asphodeleæ*, and the Pine-apple is the type of the small class *Bromeliaceæ*.

Most of the Linnæan Classes are determined by the number of the stamens; which numbers being expressed in Greek, and prefixed to the word ANDRIA (husband) form their names: MONANDRIA, the first class, having one stamen; DIANDRIA, the second class, having two stamens, &c. The same numbers prefixed to the word GYNIA (wife), distinguish the Orders of these classes: *Monogynia*, having one pistil; *Digynia*, having two pistils; as we shall presently explain more fully.

But let us continue our imaginary walk. How luxuriantly the bushes are laden with Roses! but these, which have past their prime, make a very unsightly appearance. The brown and withered petals should be cut off. Many have been cankered to the heart, and may be cut away altogether; but we must be careful not to destroy such as are likely to produce fruit, for the hips of the Rose-tree will bestow their beauty on us, when the garden is less rich in ornament than at present; and we can better bear their decayed appearance, than the want of their berries in a gloomier season. We must only crumble off the petals—but that will be an improvement. With regard, however, to what are called Hybrid Perpetual Roses, which flower a second time in the same season, the first decayed buds should be cut off, and with them the stem down to the next strong shoot, otherwise they will flower again but weakly or not at all.

Look at the calyx of this Rose (fig. 6)—these green leaves underneath the flower. Observe, there are five of them, all connected at the base; two are simple leaves (or, rather, segments—being united below); two others are set on each side, with smaller leaves; the fifth, as though uncertain which of the two examples to imitate, has one side simple, and the other edged with leaflets. Many species of the Rose have this sort of calyx, and it is a very curious one. To these succeed five petals, within which spring a great number of stamens, more than twenty, from which it takes rank in Linnæus's twelfth class, ICOSANDRIA, order *Polygynia*. According to the Natural arrangement, it belongs to the order *Rosaceæ*, which also comprehends the Strawberry-plant, Raspberry, Apple, Pear, Plum, &c., &c. The Rose claims precedence even of the Lily in poetic rank. The species are almost innumerable: we have two-and-

6

Calyx of the Rose.

twenty natives; and our gardens exhibit others from all quarters of the world: many from France, several from Persia, formerly called "the land of Roses," and from China some of the lighter and crisper species. Syria sends us the Damask Rose, and the Double Yellow Rose, which the smoky atmosphere of London strikes with almost instant death. Even Siberia has her Roses. America affords many, and has lately sent us the Yellow Rose, Isabella Grey (obtained, however, from the seed of an European species); and we have a few from Africa, of which the Musk Rose is one. Art has transformed the Rose to purple and almost to black; but its natural colours are far more agreeable. Look around you—what an endless variety! Here are Yellow Roses, and White and Red of all shades, from the faintest blush to the richest crimson, some streaked red and white. Nor is the variety in colour only: from the single-petalled Eglantine, to the swelling luxuriance of the Cabbage Rose, they present every gradation of form, size, and fulness, and of luxuriance, both in leaf and blossom.

The Damask, Provence, and Bourbon Roses, when in the height of their season, are very magnificent. Linnæus considered the Moss Rose as only a variety of the common Provence, perpetuated from what is commonly termed a "sport." It is, perhaps, the finest of them all; but this is not very easy to decide, as they all have their merits. The warm richness of the Damask Rose; the delicate blush in the very heart of the full white flowers; the light crispness of the Chinese species; all are beautiful. The season of Roses is at its height towards the end of June, but we have many rich flowers through July, some, the Bourbons and Perpetuals, through August to October, and even November, and a few, including the Chinese Roses, throughout the year. The White Rose of China flowers from June to September; the Red, from March to October; and the Chinese Monthly Rose is so called, because it blows every month, even at Christmas, and in the open air. These are not, indeed, very luxuriant, but they are delicate and graceful. (Fig. 7, *a*, Cabbage Rose; *b*, Chinese Monthly Rose.)

7

Roses.

I remember somewhere to have read the story of a youth, who, hesitating in his choice between two young ladies, was brought to a decision by means of a Rose. It happened one day, as all the three were wandering in a garden, that one of the young ladies, in haste to pluck a new-blown Rose, wounded her finger with a thorn: it bled freely, and applying the petals of a White Rose to the wound, she said, smilingly, "I am a second Venus: I have dyed the White Rose red." At that moment they

heard a scream, and fearing that the other young lady, who had loitered behind, had met with some accident, hastened back to assist her. The fair one's scream had been called forth by no worse an accident than had befallen her companion. She had angrily thrown away the offending flower, and made so pertinacious and fretful a lamentation over her wounded finger, that the youth, after a little reflection, resolved on a speedy union with the less handsome, but more amiable, of the two young friends. Happy would it be for many a kind-hearted girl, did she know by what seeming trifles the affection of those whom she loves may be confirmed or alienated for ever!

There is a little confusion among Roses. Some say the Provence is the same with the Cabbage Rose, but distinct from the Centifolia or Hundred-leaved. Some say this latter species is the same with the Provence, excluding the Cabbage Rose. Others suppose the Cabbage and the Hundred-leaved to be the same species, but differing from the Provence. Miller tells us, that the Provence is named the Cabbage Rose, from its full cabbage-like form; and describes the Hundred-leaved (*Rosa centifolia*) as a different species, still fuller, and having a number of small petals folded hard and tight over the stamens and pistils, when the flower is so full blown that the outer petals fall around the stalk. The Rosa Gallica is the same with the English Rose, and is the officinal Rose from which the distillers obtain that delightful scent, rose-water. A striped variety of this is often confounded with the York and Lancaster, which is a variety of the Damask Rose. Many persons believe a Damask Rose to be, necessarily, crimson; and the deep red Rose of China is very commonly termed the Damask China Rose, which is like talking of a French Turk. The Damask Rose is the Rose of Damascus. So much attention has of late years been devoted to improving and increasing the varieties of the Rose, that we now count upwards of 500 species, and more than 2500 varieties or shades of difference.

8

Siberian Comfrey.

What is that magnificent plant which grows so high and close under the shade of those large trees near yonder arbour? It is very like one of our native plants—the Viper's Bugloss—but the flowers are too regularly formed. It is the Siberian Comfrey (*Symphytum asperrimum*, fig. 8). See how it is covered with drooping flowers! every cluster displaying many shades of red and blue. The tube is full of honey: we cannot pluck a blossom without contending for it with the bees. These red stamens are very handsome, issuing from the

blue corolla; there are five of them. It is in the fifth class, PENTANDRIA, and the first order, *Monogynia*, to which also belong those beautiful plants, the Oleander, Azalea, Gardenia, and Violet. Of all the four-and-twenty classes into which Linnæus has divided the whole vegetable kingdom, the last only bears any comparison, in extent, with this; it is subdivided into seven orders, determined by the number of pistils. The last five orders together do not comprehend a sixth part of the class; the first two, *Monogynia* and *Digynia*, are very large. To the first order, belong the bell-shaped flowers, having a corolla of one petal, to which the five stamens are affixed, as you see in this Comfrey. The Convolvulus is of the same class and order, and has the same characters: if you split it, and spread it open, you will see the stamens affixed to it (fig. 9). They are not of equal length; but although this inequality is sometimes made a generic distinction, it does not affect the class, unless the number of stamens be four or six. These, though unequal, are not irregular; the longer and the shorter are alternate. The pistil remains in the calyx. (According to the Natural arrangement, the Comfrey belongs to the *Boraginaceæ*, and the Convolvulus to the *Convolvulaceæ*.)

9

Convolvulus.

This first order, *Monogynia*, also contains the lovely little Vergiss-mein-nicht, or Forget-me-not (*Myosotis palustris*), which has been so frequently lauded in verse, especially by the Germans, to whom we are indebted for its signification in the language of flowers; we have many beautiful native flowers, nearly connected with it; but they are excluded from the garden on account of the coarse texture and appearance of their foliage. It is remarkable, that most of the blue flowers in this class are pink in the bud. This you may observe in all the species of Myosotis; in the Alkanet (Anchusa); Hounds'-tongue (Cynoglossum), &c. This latter flower is of the finest blue imaginable. Of this class is also the fragrant Heliotrope, in the greenhouse; but the greenhouse, the garden, the woods, lanes, and meadows, are so rich in Pentandrous beauties, that I cannot pretend to enumerate a twentieth part of them. Among them, besides those mentioned above, are the Primrose, the Cowslip, the Cyclamen, the Campanula, the Honeysuckle, the elegant Periwinkle, with its broad shining leaves; the little Scarlet Pimpernel, too—a weed, it is true, and one that should be driven from the garden, but which one can scarcely find heart to banish, not only because it is so pretty in itself, but because its wide-spread blossoms denote fair weather. If, when the sun is up, this flower be still found sleeping, I would advise you not to stray far from home, for you may expect rain. So accurate is the intel-

ligence it gives on this point, that it is generally known by the name of the Shepherd's Weather-glass. It is botanically called *Anagallis arvensis*, and acquires additional interest from the fact of its being one of the only two scarlet flowers indigenous to England. Its Greek name implies that it is a laughing plant! that is, it is supposed to remove obstructions of the liver, and so restore health and spirits.

The second Linnæan order of this class contains most of the flowers termed umbelliferous (umbel-bearing). An umbel is a cluster of flowers on separate stalks, all meeting at the same point, like the springs of an umbrella reversed. The stalks which support these umbels, being again assembled, many together at one point, form a compound umbel; and most of the plants which have their flowers so disposed, belong to the second order of the fifth class. In the natural system, the *Umbelliferæ* form a distinct order, and include the Carrot, and other edible roots, as well as several acrid poisons, and among them Hemlock.

There are many indigenous red flowers; but this and the Poppy are the only scarlet ones. That handsome plant which you see climbing by the side of the Jasmine, is another of this wealthy class: a great and rather a late acquisition to our gardens. It is a Mexican plant, called the Climbing Cobœa (*Cobœa scandens*, fig. 10), brought into England in the year 1800, and some years afterwards introduced into the open garden, which it adorns with its fine flowers (which are at first yellowish white, then greenish, and lastly purple) for six months in succession. A botanist would determine this to be a Pentandrous flower before he examined it; and the student soon discovers that flowers are more readily understood than at first appears, for most of the classes have a general aspect peculiar to themselves, which a little experience teaches us to detect at a glance.

10

Cobœa scandens.

The names of the classes and orders at first alarm many persons; but if they were to look at them boldly, they would find them not such strangers as they believe them to be. In the vegetable system, as in many other things, a habit of order and arrangement appears troublesome at first, but, ultimately saves both time and toil. I will give you a specimen, to show you how much less formidable an affair Botany is than you may suppose, and will adopt the Linnæan system, as the easiest and plainest, and one which, in at least its principal features, must necessarily be known by every botanical student. Of the more philosophical or 'Natural System,' we shall incidentally say something in another place.

But before we proceed, observe that long line yonder of lofty

climbers, covered with brilliant orange-scarlet flowers and clusters of pendent beans. It is the well known SCARLET-RUNNER (*Phaséolus multiflorus*), the great solace of London gardeners, for it will blow freely and even fruit in the midst of smoke. It was brought into this country from South America in 1633. Although here naturally an annual, it may be made at least a biennial, by laying up its roots during the winter, like the Dahlia and Marvel of Peru. A peculiarity of this plant is, that though its fruit is universally edible, its roots are extremely poisonous; and we know of a case in which the skin of a dried bean proved sufficiently acrid to produce severe inflammation in the throat. It belongs to the Linn. Class DIADELPHIA, Ord. *Decandria*, and to *Leguminosæ* of the Nat. System.

I will now tell and explain to you, the names of the first ten classes of the Linnæan System. As far as ten they proceed regularly onward, the number of the class corresponding with the number of stamens. Besides their number, you are to observe, that they must be quite distinct from each other; and when there are four, or six, that two are not shorter than the rest. I told you that the Greek numbers were prefixed to the word ANDRIA; and these numbers are introduced so often in English compound words, that they are tolerably familiar to us: as 1, monologue; 2, dialogue; 3, tripod; 4, tetragon; 5, pentagon; 6, hexagon; 7, heptarchy; 8, octagon; 9, decagon; 10, decimate. These and some other words, of which the first syllable is derived from a Greek numeral, are of common occurrence. Understanding the word *andria*, then, these names are immediately familiar to us:—

1. MON-ANDRIA,	One Stamen.
2. DI-ANDRIA,	Two Stamens.
3. TRI-ANDRIA,	Three Stamens.
4. TETR-ANDRIA,	Four Stamens.
5. PENT-ANDRIA	Five Stamens.
6. HEX-ANDRIA,	Six Stamens.
7. HEPT-ANDRIA,	Seven Stamens.
8. OCT-ANDRIA,	Eight Stamens.
9. ENNE-ANDRIA,	Nine Stamens.
10. DEC-ANDRIA,	Ten Stamens.

And now to proceed in our stroll:—Those Kalmias are handsome, though somewhat formal and pattern-like. Are not these Andromedas elegant? Perseus might well kill a sea-monster for love of any one of them. One of the finest of our hardy shrubs is the *Arbutus unedo*, or Strawberry Tree (fig. 11), indigenous to Ireland, and one of its chief botanical glories. All these belong to the tenth class, DECANDRIA, *Monogynia*, or to the Nat. Ord. *Ericaceæ*. The blossom of the Arbutus is very similar to the Andromeda; and the fruit which, like the orange, hangs side by side with buds and blossoms, is beautiful and fragrant: it is well-

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The Arbutus.

flavoured, too. It has been said, that Pliny distinguished this shrub by the name of Unedo, to signify that one of the berries would suffice to those who tasted them, but this is doing the berry a great injustice: from my own experience, I should say, that some strawberries, commonly so-called, are inferior to it, both in consistency and flavour, and that the shrub is deservedly named the Strawberry tree. This friendly tree not only gives us the shade of its evergreen boughs throughout the summer, but from September to December cheers our drooping spirits with the beauty of its rosy fruit.

The pretty Syringa, or Mock Orange, has lost its sweet odours: it seldom retains its flowers beyond the end of June; but they come with the breath of May, and spread their delicate cream-coloured petals almost as lavishly over the boughs that bear them, as the orange itself. The Linnean name of this shrub is *Philadelphus coronarius*, but it is more commonly called by its old botanical name of Syringa. It ranks under Icosandria, *Monogynia*, (or Nat. Ord. *Philadelphaceæ*.)

But see, what is this plant at our feet, with its delicate leaves and rose-coloured flowers? Was ever anything more elegant? It is the beautiful Fumitory (*Fumaria formosa*, fig. 12), the type of the Nat. Ord. *Fumariaceæ*. You will find it worthy of a close examination: it is as curious as it is beautiful, but has a somewhat smoky, unpleasant smell. You see it has six stamens, but they are not distinct; they are joined together, three on each side; consequently, the plant belongs not to the sixth, but the *seventeenth* class of Linnæus—Diadelphia. From a notion, perhaps a mistaken one, of the union of brothers, these united stamens have been styled brotherhoods. Each set of united stamens being called a brotherhood, the class to which it belongs is named, in reference to their number, Diadelphia; or, if there be more than two, Polyadelphia (many brotherhoods). In these classes, the number of stamens determines the order. The union is mostly at the base, extending upward, more or less; but in this flower, they are quite distinct at the base and at the top, and joined in the middle only. Most of the Diadelphous flowers are in the order Decandria (or ten stamen'd), which is chiefly composed of the papilionaceous, or butterfly-shaped flowers; such as the Pea, Broom, Laburnum, &c. It may be considered as a poetic license to speak of their stamens as forming two brotherhoods, since it generally happens, that nine are united,

12

The Fumatory.

13

Stamens.

while the tenth is apart and alone (fig. 13). But, in justice to this single filament, I must say, that he shows great unwillingness to dissociate from his neighbours; and seems rather inclined to belong to them, than to form a separate establishment: in some few instances he is admitted, and the second brotherhood becomes merely nominal. This might make some confusion, but that we know every papilionaceous flower is bound to lodge ten brethren, of whom one is, or ought to be, left to shift for himself. He is, perhaps, the abbot, for he holds the highest station; and where we find him not, we may suppose the flower to be a sort of republican monastery, which acknowledges no chief.

It is observable, that the Diadelphous plants most commonly have their leaves ternate (set by threes), as in the Laburnum, Clover, &c.; or pinnate (composed of several leaflets set in pairs, with their faces all turned the same way), as in the Acacias, Peas, &c. The form of the flower is remarkably elegant, and has very frequently the appearance of a butterfly just about to take wing. This resemblance has not been overlooked by the quick eye of Poesy. One of her children thus describes the flower and tendrils of the red and white Garden Pea (*Lathyrus odoratus*), which gardeners call the Painted Lady:

> Here are sweet peas on tip-toe for a flight;
> With wings of gentle flush o'er delicate white.

Painted Lady is a name very commonly given to red and white flowers.

Look at this Tulip-tree; it bears a very strange title,—the Tulip-bearing Lily-tree (*Liriodendron tulipifera*). The blossoms are very magnificent, be they Tulips or Lilies, but they are not very like either, it must be confessed. The leaves look as though some fanciful person had amused himself with snipping off their ends (fig. 14). The shooting out of the young leaves is very remarkable, and deserving of attention. See, too, of the same class, both Linnean and Natural, this beautiful Magnolia, with its brilliant white flowers, and glossy heart-shaped leaves: it is called *Magnolia cordata*, but is deciduous, and less prized than the evergreen kinds, especially the noble *Magnolia grandiflora*, (fig. 15). See how finely these large flowers show against the laurel-like leaves! Gigantic laurel leaves, indeed! They are like "two single *laurel-leaves* rolled into one." There are many other species, but we have an affection for *Magnolia glauca*, with its delicate silvery down on the backs of the young leaves! They are as soft and smooth

14

Tulip-tree.

15

Magnolia grandiflora.

as satin; the older leaves are somewhat leathery. These fine shrubs are mostly from North America, where vegetation in general is on a much grander scale than in Europe. They belong, according to the Linnæan classification, to Class 13, POLYANDRIA, Order *Monogynia*, or according to the Natural system to *Magnoliaceæ*.

What have we here? A plant bespangled with gold! It is a small Swiss plant, called *Rhododendron hirsutum*. Although but of humble stature, compared with the commoner species, and deficient in size, it excels in splendour. How is it that this shrub is so seldom seen?—it is, I believe, one of the earliest Rhododendrons cultivated in this country, and is a hardy shrub. The flowers are not so conspicuous as might be expected from their fine hue and rich gilding, but when seen near, they are like a collection of gems. Every part of the flower is covered with pellucid glands of a yellow-green, or of a golden colour; in some parts, the two colours are mingled, and, seen with a magnifier, they are truly admirable. The Kamschatka Rhododendron (fig. 16) is very difficult to cultivate, though surely it might be less rare than it now is, if it can be raised in this climate at all! But attention is, perhaps, better bestowed on the large scarlet, blush, and spotted kinds, produced from *Arboreum* and *Catawbiense*, which with their rich double flowers give such grandeur to our gardens. Among these modern varietes, it will be difficult to surpass Alta-clarense, Campanulatum, Russelianum, Everestianum, Blandyanum, Brayanum, Concessum, Waterianum, Lady Cathcart, Rembrandt, and Broughtoni, all of which are perfectly hardy. The many beautiful *Sikkim* varieties, recently introduced into this country, are not yet proved to be hardy, but are a great ornament to the greenhouse, especially *Ciliatum* which flowers freely, and the beautiful *Edgeworthii*, with its large white bell-flowers so deliciously fragrant. Rhododendron is the Greek term for Rose-tree; the English name for the genus is Rose-bay, a name given to the Oleander also, and by some to the *Camellia Japonica*.

16

The Kamschatka Rhododendron.

Although the Camellia has been cultivated in England for more than a century, it is within my recollection that I heard a nurseryman ask seven guineas for one scarcely exceeding a foot in height, and bearing only one white flower. A plant of the same size may now be obtained for less than as many shillings. One great charm

in the Camellia is the season of its flowering: from the cheerless month of February till the merry month of May, it spreads its gigantic Roses, as though Flora, to show her independence and her power, had purposely chosen that blank season for one of her finest productions. It comes in the 16th class of Linnæus, MONADELPHIA, Ord. *Polyandria;* and according to the Natural arrangement among the *Teaworts,* or *Ternstræmiaceæ.*

17

Tigridia Pavonia.

When the Camellia has shed its flowers, another showy plant, of the same Linnean class, MONADELPHIA, but of a different order, *i.e., Pentandria,* succeeds it: the Tiger-flower of Mexico (*Tigridia Pavonia,* fig. 17). This flower comes fiercely forth, but recedes as quickly; it has scarcely shown itself, but it is gone. According to our old friend Gerard, it should have sprung from woman's tears.

18

Hibiscus Syriacus.

I cannot refrain from expressing my regret, that another of the Class, but of the Order *Polyandria,* the Syrian Mallow (*Hibiscus Syriacus,* fig. 18), a hardy and free flowering shrub, formerly known by the name of *Althea frutex,* is now so little seen in our gardens. It was once a great favorite, and well deserves to be so. It is quite as beautiful as the Gum Cistus, and flowers in August, when other shrubs have shed their lustre.

At this season of the year we are lost amid the manifold beauties that surround us. Observe how finely the white stigmas and anthers of this sweet Scabious, contrast with the deep rich purple florets. You cannot see the anthers in that flower; here is one in a more forward state, and you may see them distinctly—four in each floret. You will immediately perceive it to be of the Class TETRANDRIA, Ord. *Monogynia.* It has an aggregate flower, composed of several florets growing together in one receptacle; and in one calyx too, although each floret has a double calyx of its own. It is the *Scabiosa purpurea.* The French call it Fleur de Veuve (Widow-flower); the Italians, Vedovina (Little Widow). The odour of it is very sweet, but rather faint. Of this pretty tribe of plants, the old botanists number forty-three species. In the Natural Order, they are called *Teazelworts,* or *Dipsaceæ.* This shrub (fig. 19), a hardy ever-green fig-wort, of the same Linnæan class and order,

19

Buddlea globosa.

but according to the Natural System belonging to the *Scrophulariaceæ*, has aggregate flowers, and is very fragrant; it has the scent of honey, and the orange-coloured florets collected together in heads, with their gaping mouths, look not unlike the honey-comb. It is called the *Buddlea globosa*: Buddlea, from Adam Buddle, a botanist, whose Herbarium is still preserved in the British Museum; and globosa, from the round heads of the flowers.

20

Fraxinella.

This Fraxinella (or Dittany), spreads its sweet perfume far and wide during the month of June. It is altogether an exquisite plant, one of the oldest and most enduring of the English garden. The petals are elegantly disposed; the stamens too, gathering together, and dropping downward, complete the star which the upward-pointing petals had left unfinished (fig. 20). The leaves are pinnate; and pinnate leaves have always, more or less, a lightness that is peculiarly graceful. Yes; even the stamens point to the stars; for, although they droop downward, they curl round their rubied tips and point them upwards. This is the Red Fraxinella (*Dictamnus rubra*), the petals are rose-coloured, streaked with crimson; the filaments are rose-coloured, set with rubies; the anthers green, shedding a yellow pollen; the calyx deep crimson, and, as well as the backs of the petals, strewed with rubies or garnets; some of which hang upon the flower-stalks, also. How many different colours go by one name in the language of botanists! and how many different names are given to one colour! It would be an excellent thing, if some one would invent notes to express colours and perfumes, in all their shades and varieties, as we do sounds. But I have more to say of this fragrant plant: even its fruit is adorned with gems. It is rather large for the size of the flower; and like the flower, is somewhat star-like in form; and here too lodges as sweet a perfume as the flower itself affords. There is also a white Fraxinella, of which the flowers seem bedecked with emeralds and aqua-marinas, instead of rubies and garnets; and a lilac one, called *angustifolia*, from the narrowness of the leaves. All these plants belong, according to Linnæus, to (10) Decandria, (1) *Monogynia*, and according to the Natural System, to *Rutaceæ*, or Rueworts.

Now that we have had a good turn in the garden, we will look into the greenhouse for half-an-hour, and then complete our walk.

In the greenhouse which we have in our mind's eye we may fancy ourselves at the Cape of Good Hope, being surrounded by Heaths and Geraniums collected mostly from that country. The

Heath (Erica) is, beyond comparison, the largest genus in the Class Octandria, Order *Monogynia*, containing several hundred species, —the greater number very handsome. The Geraniums, commonly so called, compose three distinct genera, in Class 16, Monadelphia. They were all formerly included in one genus, in the Order *Decandria;* but the stamens being found to vary very considerably in their number, it was thought advisable to arrange them under the orders to which they rightfully belong. Those with five stamens were placed in the Order *Pentandria*, and styled Erodium (Heron's-bill): the greater number being furnished with seven stamens, were removed to the Order *Heptandria*, and named Pelargonium (Stork's-bill); these, with very few exceptions, are natives of the Cape, and chiefly shrubs: those with ten stamens were left under their old name, Geranium (Crane's-bill), in the Order *Decandria*. The names of these three genera have reference to the long beaks of the seed-vessels, which are very peculiar, and curiously constructed. They all partake of a monkey-like habit of imitation: one species apes the Ivy, another, the Heart's-ease, others, the Maple, Celandine, Southernwood, &c.: and yet there is a general family resemblance, by which a botanist will readily recognise almost any one of them at first sight; accordingly, in the natural arrangement, they come under one head, *Geraniaceæ*. The Chinese Primrose, however (*Primula Sinensis*, fig. 21), might easily be mistaken for one, even by a botanist, when it is not in flower; but it belongs to the class Pentandria, order *Monogynia*, of Linnæus, or *Primulaceæ* of the natural order. The leaves are very Geranium-like. Observe how their silken down glitters in the sun! When the light strikes favorably on them, it discovers a beauty in their scalloped edges, which may have been previously overlooked. It is just now coming into blossom. People differ widely as to its time of flowering: I suspect it to be a very docile plant, that may be taught to flower at any season. It is a great and general favorite, and more commonly known than is usual with plants that have been but so recently cultivated in England. It was introduced in 1820. In addition to the delicacy of the blossom, and the elegant appearance of the whole plant, it has the advantage of flowering during the autumn and great part of the winter.

21

Chinese Primrose.

But the plant for scent — "the *shrub* of smell divinest," is the Citron-scented Vervain. It was formerly considered as a species of Verbena (in class 14, Didynamia), and is still familiarly called a Vervain; though botanists have removed it to another Linnean

genus, and distinguish it by the appellation of *Aloysia citriodora* (fig. 22); but according to the natural arrangement it is included in the *Verbenaceæ*. This shrub, and the Peruvian Heliotrope (*Heliotropium Peruvianum*), are two of the sweetest in the green-house. The odour of the Heliotrope is in the blossom, that of the Vervain in the leaf. In the Isle of Wight, and some of the south-western counties, this fragrant shrub, known there as the Lemon-scented Verbena, flourishes well in the open air; but, in other parts of England, it is treated as a green-house plant, like the Myrtle; which, also, blooms in the open gardens in Cornwall and Devonshire, and especially in the Isle of Wight. In the whole of that garden island, but more especially on the southern side, Myrtles are seen rising, in the form of timber-trees, above the first-floor windows of the houses, and stand through the winter without any protection. I should doubt whether Italy herself could exhibit finer Myrtles than that delightful "ocean gem." They are chiefly of the large-leaved kind; and so luxuriantly covered with blossoms, as to leave it doubtful whether the green or the white be predominant. Were the blossoms but one degree less beautiful, one might think the shrub almost too richly clothed. That beautiful evergreen, the Chinese Privet (*Ligustrum lucidum*), grows there to the size of a pear-tree, and in July is profusely covered with beautiful white flowers. The *Leycesteria formosa*, too, a fine evergreen shrub, which in most parts of England is but half hardy, there covers walls of considerable height, both winter and summer, and in August blazes with its beautiful purple flowers.

Aloysia citriodora.

23

Passion Flower.

I have seen, too, in that island, some beautiful and very luxuriant specimens of the Blue Passion-flower (*Passiflora cærulea*, fig. 23), which belongs to the class MONADELPHIA, order *Pentandria*, of Linnæus. The rose-coloured species was the first cultivated in this country; but the blue is more hardy, and hangs so fine a drapery over walls and houses, that it is much more cultivated than the other: the flowers are large and handsome, and the leaves assume, in autumn, a vivid crimson that is exceedingly beautiful, more especially when wandering over a white wall. This plant was named Passion-flower from a fanciful notion that it represented the instruments of Christ's passion, of which Harte describes it as an emblem—

All beauteous flower! whose centre glows
With studs of gold; thence streaming flows
  Ray-like effulgence. Next is seen
A rich expanse, of varying hue,
Enfring'd with an empurpl'd blue,
  And streak'd with young Pomona's green.

High o'er the pointal, deck'd with gold,
(Emblem mysterious to behold!)
  A radiant cross its form expands;
Its op'ning arms appear t'embrace
The whole collective human race,
  Refuge of all men, in all lands.

The climbing shrub which grows near it is called *Periploca Græca*, and is remarkable for its fine large leaves; I always think they seem properly to belong to the Sunflower; every leaf appears as though it must have a sun of its own to shine on it, and produce so burnished a face. It is sufficiently hardy, grows very fast on a wall, and would soon be climbing after the sun, and smothering all its neighbours in its progress, were it not continually clipped. The flowers are of a dark, dull purple, and make but little show in the vicinity of its fine shining leaves. Another fine large-leaved climber, of somewhat similar habit, is the *Aristolochia sypho*, or tube-bearing Birthwort, which bears a flower about two inches long, in shape very like that of the Pitcher-plant. The Bignoniads, or Trumpet-flowers, now called *Tecoma radicans* and *grandiflora*, both of a free rapid growth, spread over walls or trees to the height of fifty or more feet, with tubular flowers in large bunches, opening at the beginning of August.

This *Hydrangea* wants water. It is true, that great drinkers being necessarily quick drinkers, revive as speedily when supplied as they droop when not supplied; but the frequent faintings that many are doomed to undergo cannot but be injurious to them. In the Isle of Wight this beautiful shrub is perfectly hardy, and by braving a succession of winters becomes a tree of some magnitude. The thirsty nature of the Hydrangea is well expressed in its name (derived from *hydor*, water, and *aggeion*, a vessel); but this being a foreign one, it would not be amiss to give it an English name, of the same signification. Such names (English as well as Latin) as express the peculiar habits of the plant, would, in many instances, be found useful; and would help those, in the management of their plants, who are not acquainted with their history. The Cistus loves the sun; the Violet, the shade; the Myrtle loves the sea-shore; the Hydrangea loves water; and the Celandine delights in chalk. All these tastes, and many others, might be expressed in their names; thus people might know how to treat exotics, and where to seek for natives. These significant names are much neglected, even in botanical language, of late, notwithstanding the example of Linnæus. A curious circumstance con-

nected with the Hydrangea is, its susceptibility in respect to soil. In common-garden mould the usual colour of the flower is greenish, changing gradually into pale rose; but in some peats and loams the colour becomes blue, and the same effect may be produced artificially by the use of iron filings with a solution of alum. Tulips, Carnations, Heart's-ease, and some other plants, are equally susceptible to marked change in colour by means of soil.

It is a grand thing to have this Cape Jasmine (*Gardenia florida*, fig. 24) so long in flower! From June till October these fine blossoms are out-rivalling the leaves in beauty. Large, glossy, evergreen leaves are always handsome, but these are particularly elegant. It is a pity to call the plant a Jasmine, for it neither is a Jasmine, nor allied to it, but belongs to the class PENTANDRIA, order *Monogynia*, or to the nat. ord. *Cinchonaceæ;* while the Jasmines belong to DIANDRIA, *Monogynia*, or the nat. ord. *Jasminaceæ*.

24

Gardenia florida.

Do you observe the different coloured flowers growing on this plant? Some of them are particoloured in themselves; others are wholly red, or blue, or violet; sometimes they are white. It is the Marvel of Peru (*Mirabilis jalapa*, see fig. 25), commonly called Four o'Clock-flower —the blossoms opening at that hour in the afternoon, and that so regularly, that it has been frequently used as a signal for the commencement of the toilet, for walking out, or for any other daily exercise. Grainger, in his poem entitled 'The Sugar-cane,' recommends the West India planters to permit their slaves to retire to their huts on the opening of these flowers, and seek shelter from the heat of the sun. It was formerly supposed to furnish the drug called jalap, and was, therefore, named *Mirabilis jalapa;* but that drug is now known to be obtained from a species of Convolvulus. Whether the wonderful property from which it derives its generic and its English names, be the regular opening of its flowers, its variety of colours, or the beautifying power of its seeds, from which the West Indian ladies prepare a cosmetic, I am wholly ignorant. Rousseau thinks that the wonder was, its growing in America; everything that came from thence being formerly considered as wonderful. This Marvel was long treated as an annual plant, and, as such, may be considered quite hardy; but it has been ascertained that the root, if kept, like the Dahlia, in dry sand during the winter, and planted again in the spring, will pro-

25

Marvel of Peru.

duce flowers for several years in succession, and become very large plants. Sometimes the flowers are all white or all red, or of intermediate tints, and there are yellow and violet varieties; the leaves, too, are handsome and luxuriant, and the plant flowers in full beauty in August and September, when most summer flowers have passed away. It belongs to the great Linnean class 5, PENTANDRIA, *Monogynia*, and to the nat. ord. *Nyctagynaceæ*.

Here is a plant of the eleventh class, DODECANDRIA, or twelve stamen'd, though the number of stamens varies from eleven to twenty. It can have no business in the green-house; but, I suppose, is not to be dispensed with anywhere. What can have made this little plant so general a favorite? It is sweet; but many others are as sweet, and much handsomer, that have not enjoyed the high and lasting favour bestowed on this. Has its name, Mignonette (Little Darling), persuaded people that they ought to love it?—This plant, botanically named *Reseda odorata*, is naturally an annual, but gardeners have contrived to make a *tree* of it; and we have seen a plant which after being kept growing for eight years in a pot, flowered freely. It is seldom that Art succeeds in contradicting Nature, she more commonly shows her skill in imitating or in aiding her, but, in this instance, she is contradicted. The plant is forbidden to bear flowers, which Nature having instructed it to do, it lingers on earth until permitted to obey the laws of its mistress, and by this contrivance is kept growing year after year, until its stem is covered with branches, and reaches a height of two or three feet.

The twelfth class is called ICOSANDRIA, or twenty stamen'd, though not limited to that number; it is distinguished from the next class, POLYANDRIA (many stamen'd), by other characters than the number of the stamens. In the twelfth class, the calyx is of one leaf, and has both petals and stamens affixed to its rim. In the thirteenth class, the stamens are fastened to the receptacle, the medium by which the flower is united with the stalk. If you eat a Raspberry, you will see a white point left at the end of the stalk, which occupied the centre of the fruit: that point is the receptacle. To go back for a moment, it may be as well to observe that the twelfth is a beneficent class, productive of many fine fruits, invariably innocent. Roses are of this class, as also the fine genus, Mesembryanthemum, and that extensive genus, the Cactus, or Melon Thistle; one of which, the beautiful Cactus commonly called the Creeping Cereus (*C. flagelliformis*) is shown in our fig. 26. Some have wondered that Nature should have

26

Cactus.

given such leaves to so fine a flower; but, doubtless, there are reasons for it. And Humboldt, in his charming work 'The Views of Nature,' has given us a clue to the very valuable property which clubby leaves have in the sandy desert, where no other kind of leaf could live. He says: "The Cactus form is peculiar to the new continent; it is sometimes globular, sometimes articulated, sometimes rising in tall polygonal columns not unlike organ-pipes. This group belongs to that class of plants which Bernardin de St. Pierre felicitously terms vegetable fountains of the Desert. In the parched arid plains of South America, the thirsting animals eagerly seek the Melon-cactus, a globular plant half buried in the dry sand, whose succulent interior is concealed by formidable prickles. The wild horses open them by stamping on them with their hoofs, a process by which they sometimes injure themselves. The stems of the columnar Cactus attain a height of more than thirty feet; their candelabra-like ramifications, frequently covered with lichens, reminding the traveller, by some analogy in their physiognomy, of certain of the African Euphorbias. These plants form green Oases in the barren desert."*

I have before observed that when a flower had four or six stamens, of which two were shorter than the rest, it was not of the fourth or sixth class: if there be four of them, the flower is in the fourteenth class, called DIDYNAMIA (two powers), as if to signify that the tall pair of stamens were very powerful and important personages. Thyme, Mint, Balm, the beautiful Foxglove, and Sweet Basil, are of this class.

The cross-shaped flowers, botanically termed cruciform (forming the class *Cruciferæ* of the natural arrangement), chiefly belong to the fifteenth Linnæan class TETRADYNAMIA, which has four tall stamens—one to guard each petal, while the humbler pair take charge of the honey-cups. Most of the genera of this class have a little pore or gland, containing honey, lying within the shorter stamens, at their base; it is owing to the curve they make to inclose these glands, that their difference of height is attributed. The Stock and Wall-flower are of this class; and so, too, is that peculiar plant, Honesty, sometimes called White Satin, of which the seed-vessels are singularly transparent and curious.

The next three classes I explained to you before, but I did not speak to you of the nineteenth; this is named SYNGENESIA (growing together), a name applicable both to the florets and their anthers. The flowers are aggregate, being composed of many perfect florets, growing on one receptacle, and in one calyx, and sometimes accompanied by female florets also. This Daisy is a specimen: let

* 'Humboldt's Views of Nature,' Bohn's edit., p. 226.

us examine it with a microscope. Perhaps you would call these white leaves of the circumference, petals—they are florets. Take one off, and you will find a very small tube at the base, containing a pistil. (Fig. 27, *a*, white floret magnified; *b*, yellow floret magnified; 1, is the seed; 2, the corolla; 3, the united anthers; 4, the cloven pistil.) The centre, or, as it is called, the disc of the flower, is a cluster of tubular florets, divided at the top into five curling lips, and each containing a pistil and five stamens. The anthers are united in a ring, through which the pistil passes and protrudes its divided stigma. The pistils in the white florets are formed like the other pistils, but are not attended by the gallant guard, by which those in the centre are protected. This pretty flower, which Chaucer so fondly petted and dandled, is named Daisy, from Day's-eye, because it opens and closes with the rising and the setting sun. If, indeed, it please Sol to take a nap at noon-day, and clouds supply his place in the heavens, the little Daisy follows that great example, and sleeps also:

> And, blushing in her sleep, she shows
> The vivid colour of the Rose
> Beneath her verdant lashes

The twentieth class, named GYNANDRIA, has the stamens situated on the pistil.

In the twenty-first class, the stamens and pistils inhabit different flowers, but on the same plant; like a fashionable pair that live in the same house, but occupy separate apartments. It is, therefore, styled MONŒCIA (one house). In the twenty-second class, the stamens and pistils keep a separate establishment altogether; lodging, not only in separate flowers, but on separate plants; whence it is named DIŒCIA (two houses). These two classes include many of our forest trees. That fine spreading shrub yonder, the Juniper (*Juniperus communis*), is Diœcious, ord. *Monadelphia*. These figures represent the barren and the fertile flowers (fig. 28); those, growing in long catkins, like caterpillars, are the barren flowers; the other is a fertile blossom, and is succeeded by the berry which gives its flavour to British gin.

Juniper.

Nature is so liberal of her treasures, and supplies us so largely, even with luxuries, that in many instances, we neglect to avail ourselves of her gifts. We procure tea from China, and disdain

our own native herbs. It is not improbable, that with a little pains, we might find a native tea quite as palatable as the foreign. Let us consider the uses of the Juniper tree alone, and we shall see the many advantages that may be derived from it. Sugar is obtained from its berries; a decoction of these is drunk by the Laplanders, as we drink coffee or tea; they furnish a wine, called by their name; and the Swedes prepare a beer from them, and a conserve which they eat at breakfast. The Germans use them to give a flavour to their sauer-kraut. The Norwegians infuse the young shoots, with a little barley, in some warm water, "which produces (says Brookes) a weak, but not unpleasant, beverage." The berries, wood, and young shoots, are used in some medicinal preparations. The berries yield an oil, which is applied to many purposes. The wood is hard, and peculiarly durable, and is used for veneering, making cabinets, &c.; and even the ashes may be turned to account. The tree, though small in a wild state, affords timber, when cultivated. A gum exudes from it, which is used in the preparation of varnish, and, when dried and strained, this gum is the powder known by the name of pounce. The bark may be manufactured into ropes. Such, and so many, are the uses of the Common English Juniper, yet, perhaps, the only use to which it is generally applied, is of a doubtful advantage,—the preparation of gin. This is by no means the most valuable of our trees; we have scarcely any one that might not be applied to many useful purposes; and many, perhaps, the utility of which might be considerably increased.

A plant of the twenty-third class is a sort of lodging-house; it is named POLYGAMIA (many marriages), and bears three kinds of flowers,—some with both stamens and pistils, others, with the stamens only, and others with the pistils: often all on the same plant, sometimes on two, and, in a few instances, on three several plants.

The twenty-fourth and last class, CRYPTOGAMIA, is very extensive and cannot be hastily explained or understood. It comprises chiefly non-flowering plants, such as Ferns, Lycopods, Mosses, Lichens, Sea-weeds, Fungi, &c.

I will set before you the latter classes, at the view, as I did the first ten:

11. DODECANDRIA, Stamens, from eleven to twenty.
12. ICOSANDRIA, Stamens, twenty or more, affixed to the calyx; the petals, also, are fastened to the calyx, which is of one leaf.
13. POLYANDRIA, Stamens, many, affixed to the receptacle.
14. DIDYNAMIA, Stamens, four: two shorter than the rest.
15. TETRADYNAMIA, Stamens, six: two shorter than the rest.
16. MONADELPHIA, Filaments united in one set.
17. DIADELPHIA, Filaments united in two sets.
18. POLYADELPHIA, Filaments united in more than two sets.

19.	SYNGENESIA,	Many florets growing in one receptacle and one calyx; anthers united in a ring.
20.	GYNANDRIA,	Stamens situated on the pistil.
21.	MONŒCIA,	Stamens and pistils in separate flowers on the same plant.
22.	DIŒCIA,	Stamens and pistils on separate flowers and plants.
23.	POLYGAMIA,	Perfect flowers on the same plant, with fertile or barren flowers, or both.
24.	CRYPTOGAMIA,	Flowerless plants, as Ferns and Fungi.

Ah! here is the beautiful Cape plant (*Calla Ethiopica*, from *kalos*, beautiful), that people insist upon calling the Arum, which, though similar in appearance, is of a different class, and fetid instead of aromatic or inoffensive. This is one of the water-loving plants; and, really, it is very spare diet for one so magnificent, with its noble flower, that looks as if it were moulded out of alabaster, and its large arrow-shaped, varnished leaves (fig. 29)! If it drank Champagne, it would be worthy of its keep. One may always have a family of these plants, for they produce a great number of off-sets, which being taken off and planted in separate pots, grow and flower in endless succession.—I could find much amusement in tending all these plants, but there is yet more pleasure in rearing them oneself. Those who expend the most time and the least money on their plants, will, probably, derive the greatest pleasure from them. It is not every one, who loves flowers, that can afford to purchase the fine exotics of the nurseries, but every one, who has leisure, may rear a few flowers from the seed, and transplant native roots. Shrubs and perennials may be transplanted from the open country, and annuals may be sown either in the spring or autumn. No plant, however handsome, is so precious to us as that which we have reared;—which, by Divine permission, we have willed and caused to exist. It has reference to ourselves. Self-love has, doubtless, a large share in the preference, but it is a very innocent modification of it; and while we value ourselves upon imitating Nature, at however humble a distance, we cannot be far wrong, for Nature is benevolent as she is lovely.

29

Calla Ethiopica.

A very pretty flower-garden may be formed of indigenous plants only. When living in the country, I have frequently transplanted roots from the neighbouring lanes and meadows; some into the open garden, others into the house. To those who reside in London, and love the country, there is a charm in our native plants, that is wanting in exotics, however beautiful: they are associated with a variety of rural objects, and bring before the imagination, the fields, woods, hills, and dales, whence they were taken. A bunch

of wild flowers is a gallery of landscapes: Daisies and Butter-cups represent fields and meadows; Germander, Speedwell, Herb Robert, and Hawthorn, are thick bushy hedges and grassy banks; the Blue Bells and Primroses are shady woods; the Water Violet and Yellow Iris are standing pools, the Marsh Marygold a running brook, and the Forget-me-not a gentle river; the Blue-bottle and Corn-campion are fields of rising corn; and the delicate Vervain is a neighbouring village. Some flowers, by association, take the form of mills, or hay-stacks; and I have known them even to portray the features of a friend. Were I condemned to an eternal residence in the metropolis, the sweetest Jasmine, the finest Moss Rose, the noblest Camellia, the rarest, handsomest, and most odorous of exotics, would have less value, in my eyes, than a common Field Daisy; and a pot of these, when in London, I generally contrive to have, counting the coming buds as a miser would count his guineas. The pretty Hare-bell (*Campanula*, fig. 30), is also a favorite:

30

Heath-bell.

"The pretty hare-bell raised its head,
Elastic from her airy tread."—*Lady of the Lake.*

Some young botanists are puzzled by the specific name, *rotundifolia*, which is applied to it,—the upper leaves being linear, and the lower, decaying very early; but if several be drawn up by the root, some will be found to retain the lower leaves, which answer to the appellation. The *Campanulaceæ* form a large and beautiful tribe of the nat. system, and come in the fifth class, first order, of Linnæus. To those who study plants botanically, the rearing of them has an additional charm: affording an opportunity of observing them in every stage of their growth, and of seeing the changes caused in wild plants by cultivation. If a plant prove handsomer than we had reason to anticipate, it seems to reflect a sort of credit on ourselves, which heightens our sense of its beauty. For an experiment in this direction, no plant will more amply repay the care of the amateur cultivator than the *Campanula pyramidalis*.

Those who reside in the country, and continually see trees and flowers around them, and breathe their odour, can have but a faint notion of the delight which a few green leaves afford to one who is doomed to gaze upon brick walls, and breathe the smoke of London. They know not the pleasure of arranging, petting, and cherishing, a few flowers, nor the importance which every green leaf acquires under such circumstances. Those who have but few flowers, learn to make the most of them, and do not crowd them together so that one half are hidden, as is the case with

bouquets in general. If you make the experiment, I think you will allow, that they look more beautiful when lightly grouped. Another thing I would recommend you to observe, in the mode of arranging them;—put many flowers of a kind together, and avoid a contrast between very strong and very opposite colours. White has a very happy effect with any colour, particularly with red. Red and White Roses, with a sprig or two of evergreen behind, and rising a little above them, look more graceful than when mingled with a variety of other flowers; if there be a deficiency of White Roses, a few Lilies may be substituted. Blue and yellow flowers may be mingled; but rather in groups, than in alternate succession. The superiority of this wholesale grouping may be seen by a visit to any large or nursery garden, where the flowers are raised in broad beds, not indiscriminately mingled. At the Crystal Palace are good examples of the so-called ribbon-gardening, which consists in contrasting long lines of highly coloured bedding plants with each other—such as Scarlet Geraniums, Yellow Calceolarias, Purple, White, and Scarlet Verbenas, &c.

Flowers in water should have a fresh supply every morning, the dead buds and decayed leaves be taken away, and the sodden ends of the stalks cut off. All the leaves should be removed from that part of the stalk which is concealed within the vase. When the flowers begin to hang their heads, and to show a general aspect of languor, cut off the ends of the stalks with a sharp knife, and put them about two inches deep in warm water for a few minutes; the water should not be actually scalding, but as hot as you can hold your hand in without a sense of pain. The moisture will make its way into the vessels of the stems; and if they be taken from the warm, and immediately replaced in fresh cold water, the flowers will revive, and yet live for some days or hours longer, according to their kind. They should not be exposed to a hot sun.

If you receive a good basket of flowers from a country friend, you may afford to sacrifice the immediate beauty of a few, to the future; some sprigs of Rosemary, Geranium, Wallflower, &c., may be stripped of their lower leaves, cut obliquely at the end with a sharp knife, and inserted about half their length in a pot of earth. This done in spring or autumn, they will put out roots, and become new plants. If covered with a glass, they will root the more speedily. It is not easy to give very minute directions for the general rearing of flowers, because different plants require different management. With regard to air, such as are purchased from a green-house must not be exposed to the cold of winter, or of sharp autumnal nights. Perhaps the best general rule that can be given for watering plants is, neither to permit the surface of the

earth to remain dry, nor to sop it to such an extent as to sodden the mould. A little observation of proportions will enable you to judge of the quantity to be given to each plant, bearing in mind that they must not, any more than yourself, drink during, or immediately after, exposure to a hot sun. If too little water has been given to a plant, and it becomes necessary to give it a fresh supply during the day, let it first be removed into the shade. Such as are placed in the open ground, will not be so absolute in their demands, because they have more earth to draw upon for a supply. Plants, when removed from one place or pot to another, should have their decayed and sodden fibres cut away; the roots should be allowed to retain their natural direction; and the plant should be shaded for several days after transplanting, that it may not perspire more than its strength will bear, while living upon a comparatively spare diet. When the roots have regained their accustomed vigour, the plant may again meet the face of the sun.

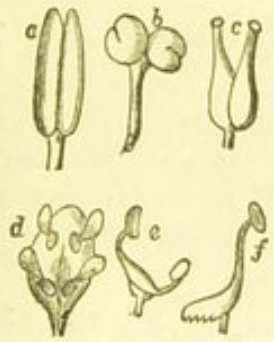
We introduced this chapter with the figure of a fair maiden collecting flowers;—we will conclude it with that of another distributing them. We might select the pretty Perdita, who bestows them as she would so many blessings, of which she thinks life is wholly made up, but we prefer portraying the forsaken Ophelia, who bestows them with a difference, and of whom the queen said, after her death,—

I thought thy bride-bed to have deck'd, fair maid;
And not have strew'd thy grave.

ILLUSTRATED TABLE OF THE LINNÆAN CLASSES AND ORDERS.

In the following arrangement of plants, which is termed "the Artificial System," there are twenty-four *Classes* or main divisions, each of which is subdivided into two or more *Orders*. Further subdivisions into *Genera* and *Species* must be sought in more elaborate treatises, or Linnæan Systems of Botany.*

Although the Linnæan system is liable to some imperfections, it is much the easiest to a beginner, and as such is advocated by Sir James Smith, Loudon, Henfrey, Balfour, and many others. Besides which, it is desirable that the botanical student should be acquainted with at least its elements, whatever knowledge of more philosophic classification may be afterwards acquired; as all the great works on botany, excepting a few comparatively modern, refer to the Linnæan system, or are arranged under it.

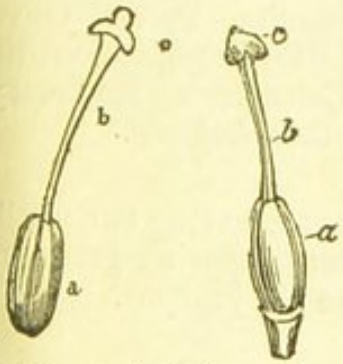


a, lily; *b*, lemna; *c*, potato; *d*, berberry; *e*, ginger; *f*, sage.

As the Stamens and Pistils are the first elements of the Linnæan arrangement, we will begin by describing them.

The Stamen consists of a thread-like stalk termed the *filament*, bearing on its summit a little yellow head called the *anther*, in which the *pollen* or *farina*, in the form of yellow dust, is enclosed. Stamens are not in the centre of the flower, but generally surround the pistil. They are of many different forms, of which the annexed figures are a few.

The Pistil is a slender greenish body in the centre of a flower, composed of three sections: the summit, which is somewhat swollen, is called the *stigma*, the base is an incipient seed-vessel called the *germen* or *ovary*, and the intermediate needle-like part is called the *style*. When the pistil is composed of a roll of one or more leaves, these are called *carpels*, which are variously denominated, according to their construction. Pistils vary greatly in their forms, as may be seen by the annexed and many following examples.



a, germen; *b*, pistil; *c*, stigma.

The remaining parts of a flower will be described on a later page.

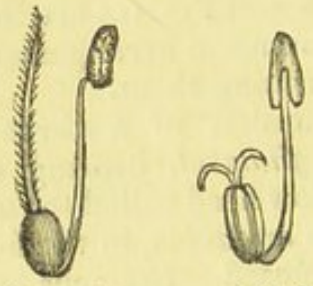
* Sir J. E. Smith's 'English Flora,' 4 vols. 8vo, 1*l.* 1*s.*; Withering's 'Botanical Arrangements,' 4 vols. 8vo, 1*l.* 1*s.*; Donn's 'Hortus Cantabrigiensis; or, an accented Catalogue of Indigenous and Exotic Plants cultivated in Great Britain' (not merely at Cambridge); with additions by Lindley, 8vo (772 pp.), Lond., 1845, Bohn, 7*s.*

SUMMARY OF DISTINCTIONS IN THE LINNÆAN CLASSES AND ORDERS.

CLASSES I to XI, inclusive, are characterised by the number of Stamens in each perfect flower.
XII and XIII depend on the situation or insertion of the Stamens.
XIV and XV are characterised by the inequality of the Stamens.
XVI, XVII, and XVIII, have Stamens united by their Filaments.
XIX, Stamens united by their Anthers into a tube.
XX, Gynandrous flowers, *i. e.*, Stamens inserted into the Germen or Style.
XXI, XXII, and XXIII, Stamens and Pistils separated, that is, barren and fertile flowers on different parts of the same plant; or barren on one plant, and fertile on another; or barren, fertile, and perfect, on the same plant.
XXIV consists of *Cryptogamia*, or flowerless plants, in which the Stamens and Pistils are either imperfectly or not at all known.

The ORDERS of the Classes I to XIII, inclusive, are distinguished by the number of Pistils.
In CL. XIV and XV, by the form of the seed-vessels or fruit.
In CL. XVI, XVII, XVIII, XX, XXI, XXII, XXIII, by the number of Stamens.
In CL. XIX, by the form and arrangement of the Florets.

CLASS I. MONANDRIA. Flowers with only one stamen. *Two orders.*

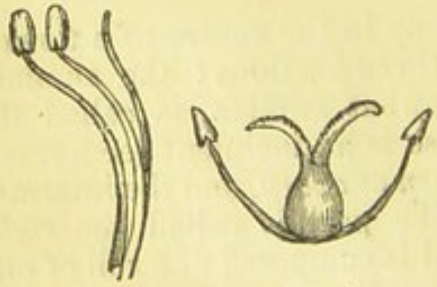


Monogynia. Digynia.

Ord. 1. MONOGYNIA, having only one pistil, as Ginger, Maranta or Arrow-root, Canna or Indian-shot, Hippuris or Mare's-tail, Glass-wort, Centranthus.

Ord. 2. DIGYNIA, having two pistils, as Water-star-wort, Strawberry-blite.

CLASS II. DIANDRIA. Flowers with only 2 stamens. *Three orders.*



Monogynia. Digynia.

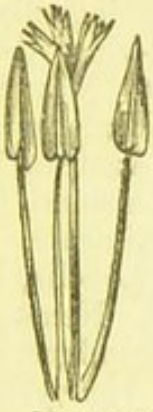
Trigynia.

Ord. 1. MONOGYNIA, having only one pistil, as Jasmine, Privet, Olive, Phyllirea, Lilac, Catalpa, Justitia, Veronica, Calceolaria, Rosemary, Sage, and other *Labiatæ*.

Ord. 2. DIGYNIA, having two pistils, as Sweet-scented Spring-grass, and the reed-like Corycarpus.

Ord. 3. TRIGYNIA, having three pistils, as Pepper and Pepper-wort (*Piperaceæ* of the Nat. ord.)

CLASS III. TRIANDRIA. Flowers with 3 stamens. *Three orders.*



Monogynia.

Digynia.

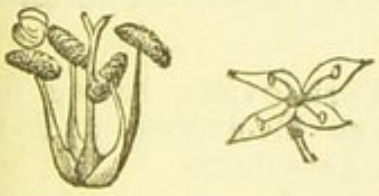
Trigynia.

Ord. 1. MONOGYNIA, having only one pistil, as the Crocus, Iris, Valerian, Gladiolus, Tritonia, Ixia, Papyrus.

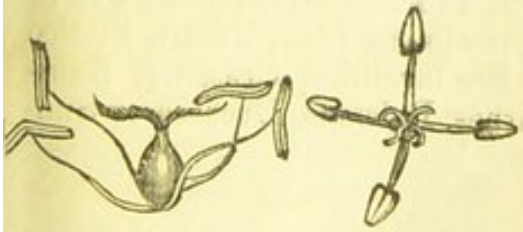
Ord. 2. DIGYNIA, having two pistils, as Wheat, Oats, Rye, Barley, Millet, Holcus, Couch-grass, Meadow-grass, Darnel, and numerous other grasses classed in the Natural arrangement as *Gramineæ*.

Ord. 3. TRIGYNIA, having three pistils, as Pipe-wort, Water-chickweed, Jagged-chickweed.

CLASS IV. TETRANDRIA. Flowers with 4 stamens of equal length. *Three orders.*



Monogynia.



Digynia. Tetragynia.

Ord. 1. MONOGYNIA, having only one pistil, as Scabious, Madder, Woodruff, Alchemilla, Teasel, Cissus, Dogwood, Buddlea, Plantain, Ixora, Galium (Bed-straw or Cleavers).

Ord. 2. DIGYNIA, having two pistils, as Buffonia, Witch-hazel, Hypecoum, Microlæna.

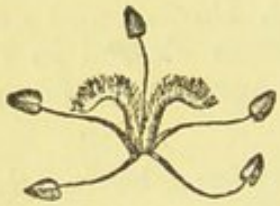
Ord. 3. TETRAGYNIA, having four pistils, as Holly, Potamogeton or Pond-weed, Pearlwort, Radiola.

CLASS V. PENTANDRIA. Flowers with 5 stamens, anthers not united. *Six orders.*

Monogynia.

Campanula.

Ord. 1. MONOGYNIA, having only one pistil, as the Grape-vine, Gooseberry and Currant, Marvel of Peru, Tobacco, Winter-cherry, Oleander, Gardenia, Azalea, Phlox, Ivy, Convolvulus, Bearbind, Comfrey, Campanula, Primrose, Forget-me-not, Violet, Lobelia, Lysimachia, Pimpernel, Nemophila, Periwinkle, Cobæa-scandens, Cæonothus, Ipomœa, Honeysuckle, Capsicum, Cyclamen.

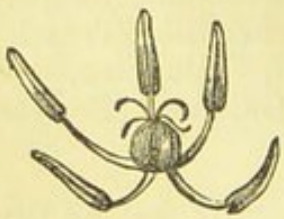


Digynia.

Ord. 2. DIGYNIA, having two pistils, as Carrot, Parsnep, Eryngium, Celery, Parsley, Myrrh, Coriander, Hemlock, Fennel (all *Umbelliferæ*), Stephanotis, Hoya, Gentiana.

Trigynia.

Ord. 3. TRIGYNIA, having three pistils, as Sumach (including the pretty Rhus Cotinus), Guelder-rose, Elder, Tamarisk, Laurestine.



Tetragynia.

Ord. 4. TETRAGYNIA, having four pistils, as Evolvulus and the Grass of Parnassus.

Pentagynia.

Ord. 5. PENTAGYNIA, having five or six pistils, as Flax, Thrift, Statice or Sea-lavender, Crassula, Kalosanthes, Balsams, Drosera or Sundew.

Ord. 6. POLYGYNIA, having six or more pistils, as the Myosurus, or Mouse-tail, Xanthorhiza, and Ceratocephalus.

CLASS VI. HEXANDRIA. Flowers with six stamens of equal length. *Five orders.*

Monogynia.

Ord. 1. MONOGYNIA, having only one pistil, as the Pine-apple, Narcissus, Lily, Tulip, Hyacinth, Tritoma, Squill, Garlic, Dracæna, Aloe, Yucca, Snowdrop, Snowflake, Star of Bethlehem, Bluebell, Lily of the Valley, Rush, Tradescantia, Asparagus, Amaryllis, Barberry.

Digynia.

Ord. 2. DIGYNIA, having two pistils, as Rice, Mountain-sorrel, Panic-grass.

Ord. 3. TRIGYNIA, having three pistils, as Dock, Colchicum or Meadow-saffron, Arrow-grass, Sorrel.

Trigynia.

Ord. 4. HEXAGYNIA, having six pistils, as Actinocarpus (an aquatic), and Aristolochia.

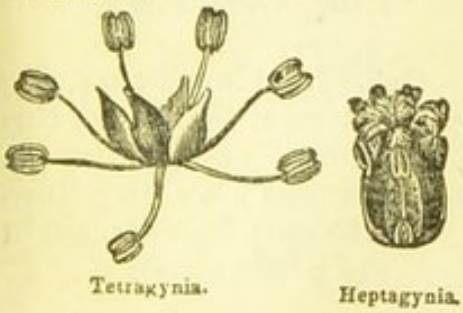
Ord. 5. POLYGYNIA, having more than twelve pistils, as Alisma or the Water-plantain.

CLASS VII. HEPTANDRIA. Flowers with seven stamens. *Four orders.*

Monogynia. Digynia.

Ord. 1. MONOGYNIA, having only one pistil, as the Horse-chestnut, Chickweed-Wintergreen, Calla palustris, Pisonia, Dracontium.

Ord. 2. DIGYNIA, having two pistils, as Limeum Africanum.

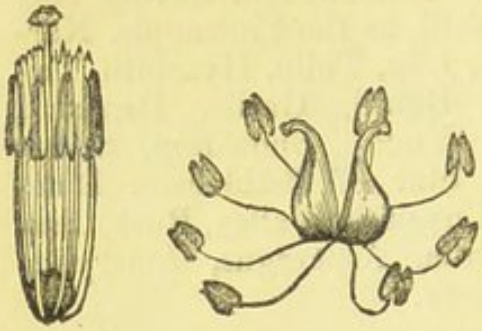


Tetragynia. Heptagynia.

Ord. 3. TETRAGYNIA, having four pistils, as Lizard's-tail, Astranthus or Chinese Star-flower.

Ord. 4. HEPTAGYNIA, having seven pistils, as Septas, one of the *Crassulaceæ*.

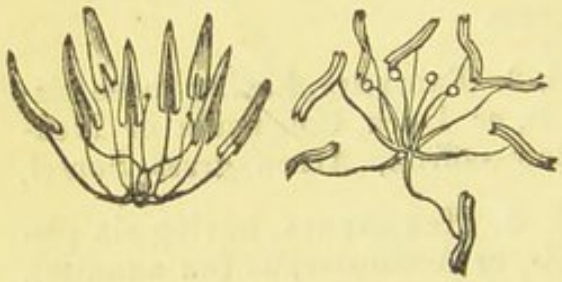
CLASS VIII. OCTANDRIA. Flowers with eight stamens. *Four orders.*



Monogynia. Digynia.

Ord. 1. MONOGYNIA, having only one pistil, as the Heaths, Fuchsia, Œnothera or Evening-primrose, Tropæolum, Rhexia, Clarkia, Godetia, Vaccinium or Whortle-berry, Daphne.

Ord. 2. DIGYNIA, having two pistils, as the White-ash, Weinmannia, and the little rock-work plant Moehringia.

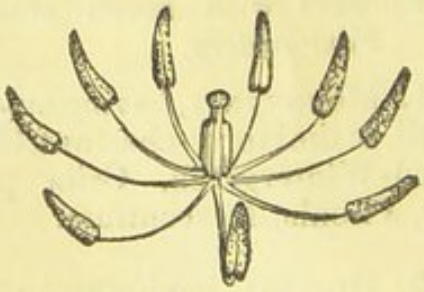


Trigynia. Tetragynia.

Ord. 3. TRIGYNIA, having three pistils, as Persicaria, Buckwheat, Soap-berry.

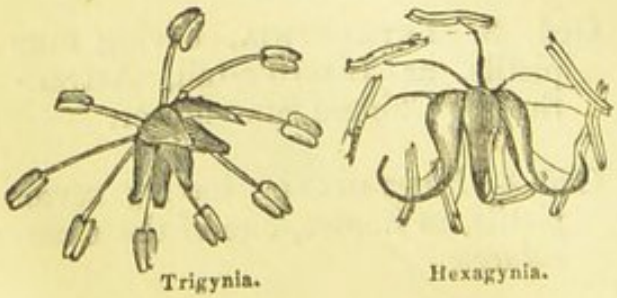
Ord. 4. TETRAGYNIA, having four pistils, as Herb-Paris or True-love, Francoa, Elatine or Water-pepper-wort, Loudonia.

CLASS IX. ENNEANDRIA. Flowers with nine stamens. *Three orders.*



Monogynia.

Ord. 1. MONOGYNIA, having only one pistil, as the Bay-tree, Benzoin, Sassafras, Cinnamon, Camphor, Sorrel, Cashew-nut.

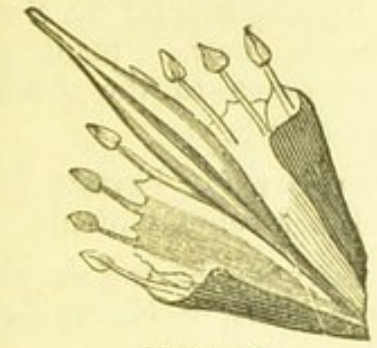


Trigynia. Hexagynia.

Ord. 2. TRIGYNIA, having three pistils, as Rhubarb, Eriogonum, Pleea.

Ord. 3. HEXAGYNIA, having six pistils, as Butomus umbellatus, or common Flowering Rush (the only British plant in the whole class).

CLASS X. DECANDRIA. Flowers with ten stamens. *Five orders.*



Monogynia.

Ord. 1. MONOGYNIA, having only one pistil, as the Arbutus or Strawberry-tree, Andromeda, Pernettya, Gaultheria, Kalmia, Ledum, Rhododendron, Fraxinella, Rue, Quassia, Pleroma, Piptanthus.

Ord. 2. DIGYNIA, having two pistils, as Saxifrage, Hydrangea, Pink, Carnation, Soap-wort.

Digynia.

Trigynia.

Ord. 3. TRIGYNIA, having three pistils, as Catchfly, Chickweed, Deutzia.

Ord. 4. PENTAGYNIA, having five pistils, as Corn-cockle, Viscaria, Agrostemma, Lychnis, Cerastium, Cotyledon or Navel-wort, Sedum or Stone-crop, Wood-sorrel, Oxalis, Echeveria pulverulenta.

Pentagynia.

Decagynia.

Ord. 5. DECAGYNIA, having ten pistils, as Phytolacca. No British species.

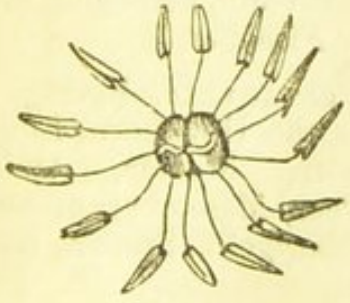
CLASS XI. DODECANDRIA. Flowers with eleven to nineteen stamens. *Eight orders.*

Monogynia.

Trigynia.

Ord. 1. MONOGYNIA, having only one pistil, as Asarum, Calandrinia, Cuphea, Lythrum, Mangrove.

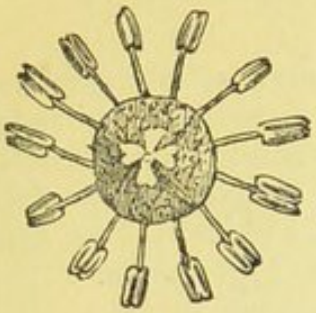
Ord. 2. DIGYNIA, having two pistils, as Agrimony (one of the *Rosaceæ*), Callicoma.



Digynia.

Ord. 3. TRIGYNIA, having three pistils, as Mignonette, Poinsettia. (Euphorbia or Spurge, formerly placed here, is now removed to Class XXI, MONŒCIA, *Monandria.*)

Class XI. Dodecandria—*continued.*

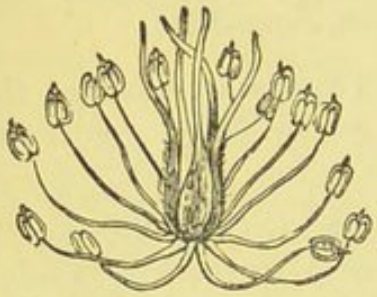


Tetragynia.

Ord. 4. Tetragynia, having four pistils, as Aponogeton (of the Nat. ord. *Fluviales*, now a plant of much importance to the fresh-water Aquarium).

Ord. 5. Pentagynia, having five pistils, as Blackwellia, Gillenia.

Ord. 6. Hexagynia, having six pistils, as Cephalotus, or North Holland Pitcher-plant.



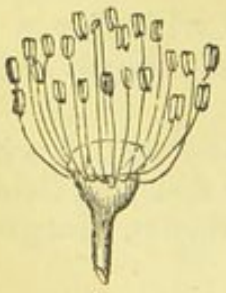
Pentagynia.

Ord. 7. Heptagynia, having seven pistils, as Monanthes polyphylla (Nat. ord. *Crassulaceæ*).

Ord. 8. Dodecagynia, having twelve pistils, as Sempervivum or House-leek, and Æonium (both of the Nat. ord. *Crassulaceæ*).

*** *The next two classes present a variety in the situation of their stamens, and in this respect differ from each other.*

Class XII. ICOSANDRIA. Flowers with twenty or more *perigynous* stamens, that is, arising from the inner edge of the calyx, as in the Rose. *Five orders.*



Monogynia.

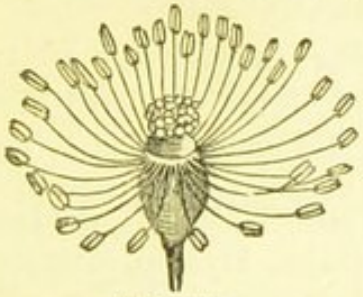
Ord. 1. Monogynia, having only one pistil, as in the Eucalyptus or Gum-tree, Clove-tree, Guava, Myrtle, Eugenia, Echino-cactus, Melo-cactus, Opuntia, Céreus; Peach, Apricot, Plum, Almond, and Cherry-tree; Pomegranate, Syringa.

Ord. 2. Trigynia, having three pistils, as Sesuvium, belonging to the Nat. ord. *Ficoidiæ*.

Di-Pentagynia.

Ord. 3. Pentagynia, having five pistils, as the Hawthorn, Loquat, Cotoneaster, Medlar, Quince, Apple, Pear, Mesembryanthemum or Fig-Marygold, Spiræa, Kerria japonica.

Class XII. Icosandria—*continued.*



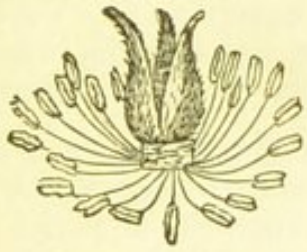
Polyginia.

Ord. 5. Polygynia, having many pistils, as the Rose, Bramble, Raspberry, Strawberry, Potentilla, and Geum (all belonging to the Nat. ord. *Rosaceæ*), and Calycanthus or Alspice-tree.

Class XIII. POLYANDRIA. Flowers with numerous *hypogenous* stamens, that is, arising from the base of the flower, called the receptacle, as in the Ranunculus. *Seven orders.*

Monogynia.

Ord. 1. Monogynia, having only one pistil, as Caper-tree, Helianthemum or Sun-rose, Cistus or Rock-rose, Eschscholtzia, Poppy, Celandine, Water-lily, Victoria-Regia, Lime-tree, Cork-tree, Bartonia, Loasa.



Di-Trigynia.

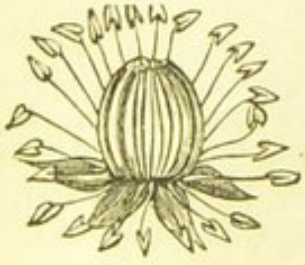
Ord. 2. Digynia, having two or more pistils, as Pæony, Fothergilla.

Ord. 3. Trigynia, having three pistils, as Larkspur, Aconite or Monk's-hood.

Pentagynia.

Ord. 4. Tetragynia, having four pistils, as Bug-wort, Butter-nut.

Ord. 5. Pentagynia, having five pistils, as Columbine, Nigella or Fennel-flower.



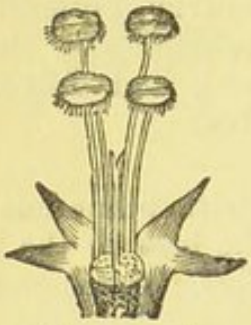
Polygynia.

Ord. 6, Hexagynia, having six pistils, as Stratiotes or Water-soldier.

Ord. 7. Polygynia, having many pistils, as Magnolia, Custard-apple, Tulip-tree, Anemone, Hepatica, Adonis, Hellebore, Trollius or Globe-flower, Ranunculus, Clematis, Marsh-marigold.

*** *The next two classes are founded on the relative length of the stamens.*

CLASS XIV. DIDYNAMIA (meaning superiority of two). Flowers with four stamens, two long and two short. *Two orders.*



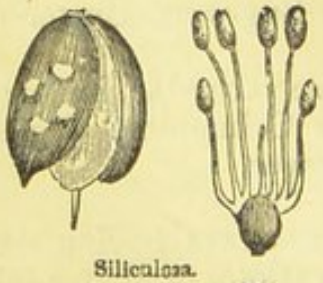
Gymnospermia.

Ord. 1. GYMNOSPERMIA (naked seeds), carpels four, one-seeded, as Lamium, Galeopsis or Hemp-nettle, Balm, Hyssop, Marjoram, Basil, Lavender, Perilla, Mint, Thyme, Ground-ivy, Mother-wort, Horehound (all of the Nat. ord. *Labiatæ*).

Angiospermia.

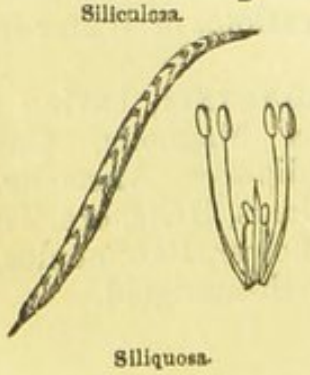
Ord. 2. ANGIOSPERMIA, having seeds inclosed in a pericarp or capsule, as Digitalis or Foxglove, Lophospermum, Linaria or Toad-flax, Antirrhinum, Scrophularia, Orobanche, Collinsia, Mimulus, Penstemon, Gloxinia, Achimenes, Bignonia or Trumpet-flower, Tecoma, Acanthus, Verbena, Lantana, Thunbergia. (All of this order, with the exception of Verbena, Orobanche, and Linaria, belong to the Nat. ord. *Scrophularineæ*.)

CLASS XV. TETRADYNAMIA (meaning superiority of four). Flowers with six stamens, four long and two short. A very natural class, comprehending all the cruciform flowers. *Two orders.*



Siliculosa.

Ord. 1. SILICULOSA, having seeds in a silicula, or short pod, called a pouch, as Scurvy-grass, Candy-tuft, Honesty, Alyssum, Königa, Capsella or Shepherd's-purse, Pepper-wort, Horse-radish, Seakale (all belonging to the Nat. ord. *Cruciferæ*).



Siliquosa.

Ord. 2. SILIQUOSA, having seeds in a siliqua, or long pod, as Radish, Nasturtium, Seakale, Erysimum, Wall-flower, Stock, Rocket, Arabis, Cabbage, Mustard (all *Cruciferæ*).

*** *The next three classes depend on the coherence or union of the filaments of the stamens into parcels, called* adelphia, *or brotherhoods.*

CLASS XVI. MONADELPHIA (meaning a single brotherhood). Flowers with all their stamens united by their filaments at the base, forming a tube which surrounds the pistil. *Eight orders.*

Triandria.

Pentandria.

Ord. 1. TRIANDRIA, having three united stamens, as Tigridia or Tiger-flower, Tamarind-tree.

Ord. 2. PENTANDRIA, five united stamens, as Tacsonia, Passion-flower, Heron's-bill, Hermannia.

Ord. 3. HEXANDRIA, six united stamens, as Peritoma, Gynandropsis.

Heptandria.

Octandria.

Ord. 4. HEPTANDRIA, having seven united stamens, as the Pelargonium or Stork's-bill, &c. (all Nat. ord. *Geraniaceæ*).

Ord. 5. OCTANDRIA, having eight united stamens, as Aitonia Capénsis.

Decandria.

Dodecandria.

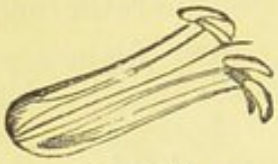
Ord. 6. DECANDRIA, having ten united stamens, as the Geranium or Crane's-bill.

Ord. 7. DODECANDRIA, having from twelve to nineteen stamens united by their filaments, as Helictores or Screw-tree, Eriodendron, Monsonia, Dombeya, Cheirostemon.

Polyandria.

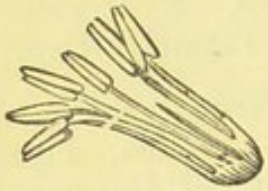
Ord. 8. POLYANDRIA, having more than twenty stamens united in a tube at the base, the points spreading and terminating in oblong anthers, as the Mallow, Pavonia, Althæa, Lavatera, Hibiscus, Holly-hock, Gossypium or Cotton-tree, Bombax or Silk-cotton-tree, Camellia.

CLASS XVII. DIADELPHIA (two brotherhoods). Flowers with their stamens usually united in two sets or parcels by their filaments, but sometimes combined in one, as in the MONADELPHIA. *Four orders* (all *Papillionaceous* flowers).



Pentandria.

Ord. 1. PENTANDRIA, having five stamens united into two sets (two above and three below), as Monnieria, Petalostemum.

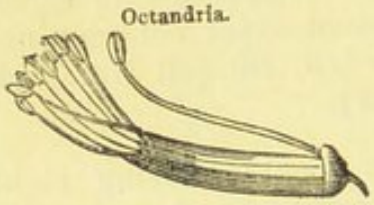


Hexandria

Ord. 2. HEXANDRIA, having six stamens united into two sets of three each, as Fumitory, Corydalis, Dielytra spectabilis.

Ord. 3. OCTANDRIA, having eight stamens (four above and four below) united at the base into two sets, as Polygala or Milk-wort.

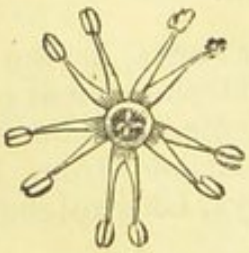
Octandria.



Decandria.

Ord. 4. DECANDRIA, having ten stamens (one above and nine below) united in a cleft-tube surrounding the ovary, as Spanish Broom, Furze, Clover, Pea, Lathyrus, the Vetches, Clianthus or Glory, Pea-flower, Liquorice, Bladder Senna, Coronilla, Genista, Cytisus, Lupine, Bean, Saintfoin, Wistaria, Robinia (all Nat. ord. *Leguminosæ*).

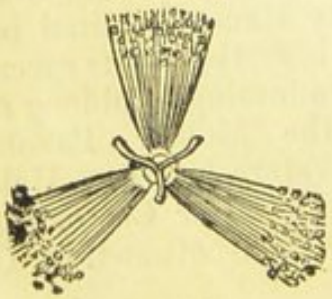
CLASS XVIII. POLYADELPHIA (many brotherhoods). Flowers with the stamens united into three or more sets by their filaments. *Four orders.*



Decandria.

Ord. 1. DECANDRIA, having ten stamens, united into more than two sets, as Chocolate-nut-tree.

Ord. 2. DODECANDRIA, having from twelve to nineteen stamens, united into more than two sets, as Bastard Cedar, Abroma.



Polyandria.

Ord. 3. ICOSANDRIA, having twenty or more stamens united into more than two sets, as Melaleuca, Tristania, and other *Myrtaceæ*.

Ord. 4. POLYANDRIA, having numerous stamens united into more than two sets, as the Orange-tree, St. John's-wort.

*** *The remaining five classes are founded on the union or disunion of stamens and pistils.*

CLASS XIX. SYNGENESIA (which means "growing together"). Compound flowers, with many florets inclosed by a common calyx: stamens united by their anthers. This forms a Natural class, as all the examples in it belong to the Nat. ord. *Compositæ*. *Five orders.*

Ord. 1. POLYGAMIA ÆQUALIS (flowers all equal), having perfect florets, each with five stamens, a pistil, and one seed: as Ageratum, Humea elegans, the Thistles, Artichoke, Scorzonera, Goat's Beard, Dandelion, Lettuce, Hawkweed, Sowthistle, Cotton-weed.

Æqualis.

Ord. 2. POLYGAMIA SUPERFLUA (some flowers superfluous), having the florets of the disc perfect, that is, with stamens and pistil; those of the ray with pistils only; but both kinds producing perfect seed: as Groundsel, Cineraria, Golden-rod, the Asters, Daisy, Dahlia, Chamomile, Zinnia, Fever-few, African Marygold, Chrysanthemum, Xeranthemum, Helichrysum or Golden-sunflower, Gnaphalium or Everlasting.

Superflua.

Ord. 3. POLYGAMIA FRUSTRANEA (some flowers neuter), having the florets of the disc perfect, but those of the ray sterile: as Helianthus or Sunflower, Cosmos, Coreopsis, Calliopsis, Gaillardia, Centaurea, Sweet Sultan.

Ord. 4. POLYGAMIA NECESSARIA (central and marginal flowers necessary for perfect seed), having stamens only in the florets of the disc, those of the ray with each a pistil only: as Marygold, Ragwort, Blumea.

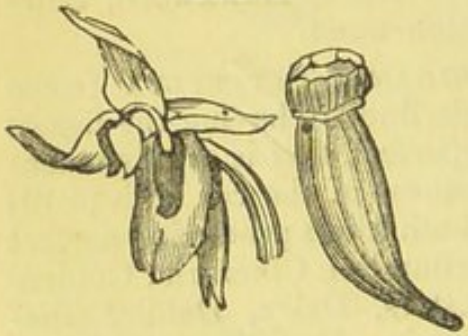
Ord. 5. POLYGAMIA SEGREGATA (flowers separated), with several flowers, either simple or compound, but with united anthers and a proper calyx, all included in one common calyx: as Elephant's-foot, Globe-thistle.

CLASS XX. GYNANDRIA (meaning pistil and stamen). Flowers with the stamens growing out of either the pistil or germen. *Three orders.*

Monandria.

Ord. 1. MONANDRIA, having one stamen attached to the pistil, as the Orchis, Helleborine, Coral-root, Dendrobium, Cattleya, Stanhopea, Oncidium, Vanda, and other *Orchidaceæ.*

Ord. 2. DIANDRIA, having two stamens inserted into the pistil (a third, or middle one, abortive), as Cypripedium or Lady's-slipper.



Diandria. Hexandria.

Ord. 3. HEXANDRIA, having six stamens inserted into the pistil, as Aristolochia.

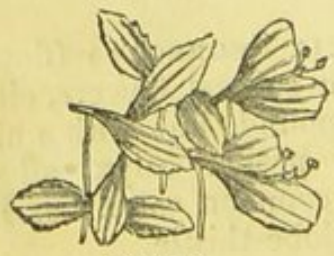
This class formerly had ten orders, but the remaining seven have been abolished by removal to other classes.

*** *In the three following classes the flowers are imperfect, that is, the essential organs of both kinds are not present in the same flower.*

CLASS XXI. MONŒCIA (one household). With stamens and pistils in separate flowers on the same plant. *Ten orders.*

Monandria.

Ord. 1. MONANDRIA, having only one stamen, as Bread-fruit-tree, Spurge, Horned Water-weed, Euphorbia (Casuarina or Shrubby Horse-tail is now transferred to CRYPTOGAMIA).



Diandria.

Ord. 2. DIANDRIA, having two stamens, as Duck-weed, Water Starwort.

Ord. 3. TRIANDRIA, having three stamens, as Indian-corn, Carex or Sedge, Bur-reed, and other sedges.

Class XXI. MONŒCIA—*continued.*

Tetrandria.

Ord. 4. TETRANDRIA, having four stamens, as Aucuba, Guettarda, Box-tree, Alder, Mulberry, Nettle, Upas-tree.

Ord. 5. PENTANDRIA, having five stamens, as Shrubby Trefoil, Amaranth, Bryony (or in Ord. 9).

Pentandria.

Ord. 6. HEXANDRIA, having six stamens, as Canada Rice, Hickory-nut, Sago-palm, Cocoa-nut.

*** Carpenter introduces OCTANDRIA and ICOSANDRIA here, and omits Orders 9 and 10.

Hexandria.

Ord. 7. POLYANDRIA, having from seven to many stamens, as Arum, Coriaria myrtifolia, Caladium, Begonia, the Oak, Walnut, Hazel-nut, Beech, Birch, Spanish-Chest-nut, Hornbeam, Plane, Sarisburea or Maiden-hair-tree, Liquid-amber, Burnet.

Polyandria.

Ord. 8. MONADELPHIA, having united stamens in different flowers, that is, masculine, feminine, and bisexual, on the same plant, as the Pine or Fir-tree, Larch, Cedar, Abies, Deciduous Cypress, Dacrydium, Podocarpus, Dammara, Cunninghamia, Arbor-vitæ, Croton.

Monadelphia.

Ord. 9. SYNGENESIA, having stamens united by their anthers, as Bryony, Pumpkin, Cucumber, Gourd.

Ord. 10. GYNANDRIA, having the stamens inserted into the germen or pistil, as Andrachne or Bastard-orpine.

CLASS XXII. DIŒCIA (two households). The stamens and pistils being not only on separate flowers, but those flowers on two separate plants. *Thirteen orders* (some naturalists admit only eight, abolishing all after Ord. 7, excepting *Monadelphia;* some twelve, and Loudon and Donn the whole thirteen; but there are very few species to represent several of the orders).

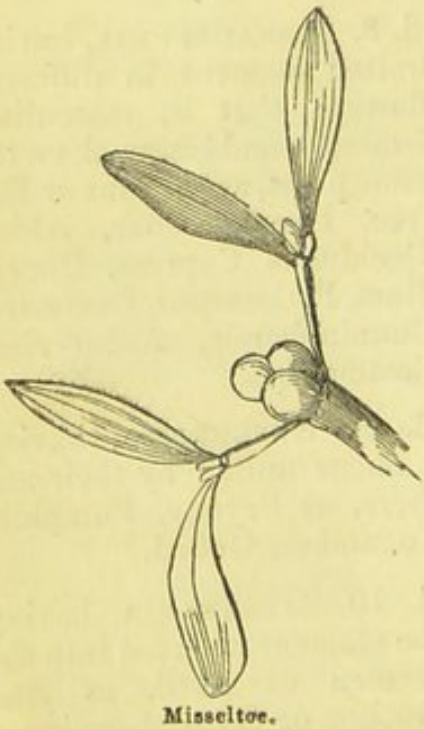
Monandria.

Ord. 1. MONANDRIA, having one stamen, as Pandanus or Screw-pine, Bread-nut-tree, Galactodendron or Cow-tree, and Trichocladus or Hair-branch.

Diandria.

Ord. 2. DIANDRIA, having two stamens, as the Willow, Valisneria spiralis, Cecropia or Snake-wood, and Borya.

Ord. 3. TRIANDRIA, having three stamens, as Crow-berry or Crake-berry, Rope-grass, Osyris or Poet's Cassia.



Misseltoe.

Ord. 4. TETRANDRIA, having four stamens, as Amber-tree, Misseltoe, Osage Orange, Garrya eliptica, Hop, Hemp.

Ord. 5. PENTANDRIA, having five stamens in flowers on a distinct plant, the pistil being produced in flowers by a separate plant, as Spinach, Xanthoxylum or Tooth-ache-tree, Acnida or Bastard-hemp.

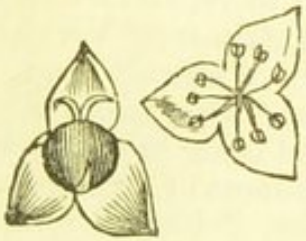
Ord. 6. HEXANDRIA, having six stamens, as Date-palm, Tamus or Black Bryony, Dioscorea or Yam, Cocculus Indicus.

Class XXII. DIŒCIA—*continued.*

Octandria.

Ord. 7. OCTANDRIA, having seven to eight stamens, as Poplar, Sedum-Rhodiola or Rose-root.

Ord. 8. ENNEANDRIA, having nine stamens, as Dog's-mercury, Hydrocharis or Frog-bit, Anacharis, or American Water-weed.



Enneandria.

Ord. 9. DECANDRIA, having ten stamens, as the Carica or Papaw-tree, Coriaria, Rhus caustica.

Ord. 10. DODECANDRIA, having from twelve to nineteen stamens, as Moon-seed, Datisca.

*** Loudon adds ICOSANDRIA here and abolishes GYNANDRIA.

Monadelphia.

Ord. 11. POLYANDRIA, having numerous stamens arising from the receptacle or calyx, as Tasmannia, Cycas, Cliffortia, Ivory-nut.

Ord. 12. MONADELPHIA, having stamens united at their base into one set, as the Yew, Araucaria, Juniper, Butcher's Broom, Nutmeg, Nepenthes or Pitcher-plant.

Gynandria.

Ord. 13. GYNANDRIA, having stamens inserted into the germen or pistil; the only example is Cluytia (which some place in *Pentandria* and so abolish this order).

CLASS XXIII. POLYGAMIA (many marriages). Having flowers of three different kinds, viz., with stamens only, pistils only, or stamens and pistils united; either on the same plant, or on two or three different plants of the same species. *Three orders* (Loudon and others make only two, by incorporating *Triœcia* with *Diœcia*).

Monœcia.

Ord. 1. MONŒCIA, having stamens and pistils separate in some flowers, united in others, all on one plant; as the Plantain-tree, Veratrum or Hellebore, Wallichia and other Palm-trees; Sorghum, Ægilops, and several other grasses; Maple, Holcus, Mimosa or Sensitive-plant, the Acacias, Pellitory of the wall, Atriplex or Orache.

Ord. 2. DIŒCIA, having the two or three kinds of flowers on two separate plants, as the Ash-tree, Date-plum, Gleditschia or Three-thorned Acacia, Fig-tree; and Chamærops, which is one of the Palms.

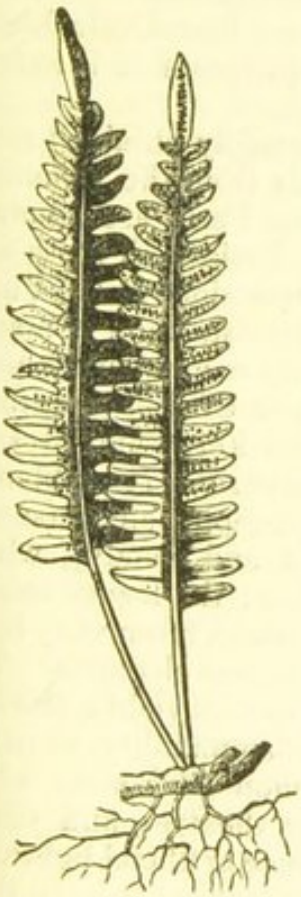
Diœcia.

Ord. 3. TRIŒCIA, having the two or three kinds of flowers on three separate plants; that is, stamens on one, pistils on another, and stamens and pistils united on a third; as Ceratonia siliqua or the Carob-tree.

*** *With these twenty-three classes the flowering plants end. The next class, which is the last in the Linnæan arrangement, consists of plants called flowerless, or Cryptogamic, their organs of fructification being concealed, or at least not perceptible to the naked eye.*

CLASS XXIV. CRYPTOGAMIA. *Flowerless plants;* that is, plants with inconspicuous flowers, the stamens and pistils being either indistinguishable or absent. The Linnæan classification comprises only five orders, viz.—1, *Ferns;* 2, *Mosses;* 3, *Liverworts;* 4, *Sea-weeds;* 5, *Mushrooms:* but as this class is now always studied separately according to the Natural system we give the ten orders into which it is currently divided.

1. FILICES (*Ferns*). Herbaceous plants, mostly perennial, with radical or alternate leaves, which, as they partake of the nature of branches, are usually called *fronds.* In most genera these fronds, when young, roll inwards at the top, like a shepherd's crook, and the root-stalks are more or less covered with broad scales. The fructification is in the form of spores, or embryo seeds, inclosed in capsules called *sporangia* or spore-cases, arranged in clusters on the under surface or margins of the leaf, and sometimes in spikes or panicles at the top of it. These seeds are so minute as to float in the air like smoke, whence the old notion, that the possessor of fern-seed became invisible. So Shakespeare—"We have the recipe of fern-seed, we walk invisible."



Polypodium vulgare, common Polypody or Wall-fern.

The Fern family is very interesting and extensive, and has of late years become a special and popular study. Among many beautiful species are: the *Adiantum*, *Gymnogramma*, and *Cheilanthes.* The *Osmunda Regalis*, or so-called Flowering-fern, is remarkable for its lofty growth (sometimes reaching the height of ten feet), and for its fructification in a compound panicle at the top, which assumes the appearance of a brownish inflorescence. This is the tallest European Fern; but in the tropics we find the Arborescent or Tree-ferns from forty to eighty feet in height, growing in the form of palm-trees, with thick woody stems.

Many have been accustomed to regard Ferns as not of any particular utility to man, but this is far from being really the case. By Linnæus the Ferns were poetically denominated *Novaccolæ*, or new settlers, a term which very happily expresses their habits and their importance in the economy of nature, for after, the Mosses,

they are among the first colonists of barren tracts which will not yet bear a luxuriant vegetation, but have to be gradually prepared for the sustenance of higher plants.

The commonest perhaps of our Ferns, the *Brake*, is occasionally used as food by the inhabitants of Normandy, Kamschatka, and the Canary Isles; the fronds make a most excellent litter for cattle and pigs, and if cut while young and boiled, are readily eaten by them. The species of *Brake* found in Van Diemen's Land is extensively used for feeding pigs, and sometimes by the natives themselves, who roast the root, and eat it as a relish to their kangaroos.

On the Continent its astringent qualities are found valuable in tanning kid and chamois leather, for which purposes it is extensively used.

Starch, fit for domestic purposes, may be readily obtained from the stems of almost any Fern, and especially from the *Osmunda Regalis*; and so indirectly may *soap*, as all the Ferns are remarkable for the quantity of alkali they contain. Besides all these and some other qualities contained in the Fern, gardeners and agriculturists know of many, which it is not necessary to enumerate here.

Equisetum arvense or Corn Horsetail: 1, a peltate disc, with its attached spore-cases, separated and seen from the side.

2. The LYCOPODS, or *Club-mosses*, form a marked link between Ferns and Mosses, to which latter they have some resemblance. They have generally creeping stems (sometimes becoming erect and woody), which produce leafy branches; the leaves sessile, imbricated, or verticillate, often very large and spreading, and of great elegance. The microspores of some species yield a powder, remarkable for its inflammability, as in the instance of the common *Club-moss*, which was long used at our theatres, and still is in Germany, to produce artificial lightning. Lycopods, like Ferns, appear to have their arborescent forms, for there has lately been found growing in Borneo a tree-Lycopod, of a singular tassel-like foliage, which is about to be introduced into this country by Messrs. Low and Co., of Clapton.

3. EQUISETACEÆ or *Horsetails* (from *Equus*, a horse, and *seta*, a hair or bristle), a curious little group of plants, sometimes termed "Jointed Ferns," because jointed like a bamboo cane; common in ditches, brooks, and marshy meadows, where they sometimes form an abun-

dant crop, and look like a forest of young firs. They have a creeping stem, that runs along the ground, sending up at intervals their curious bristly branches, which are commonly regarded as stems. Their fructification is terminal, in a cluster of peltate or shield-like discs, which form a sort of cone. The cuticle is remarkable for the manner in which it is fortified with extremely minute particles of silex or flinty substance; and one species, highly developed in this particular, the *Dutch Rush*, is imported from Holland for the purpose of polishing furniture and pewter utensils. There are ten British species, of which the pretty little *Equisetum sylvaticum*, or Wood-Horsetail, sometimes called the *Fairy Larch*, which grows freely about Hampstead, is one of the most elegant. Their branches, especially when young, are eaten by some animals, and the underground stems occasionally swell into starchy tubercles, which may be used as food by man. But the grandest of the British species is *Telmateia*, or Great Horsetail, which sometimes reaches the height of nine feet; and the grandest of foreign species is found in the swampy lands of South America, growing to the height of fifteen feet, with a diameter of three inches to their stems.

4. Marsileaceæ (*Pepper-worts*, *Quill-worts*, or *Pill-worts*), named by Linnæus, after Count Marsigli. Small aquatic plants of various regions, with perennial roots; stemless and creeping or floating, leaves filiform; fructification globular, inclosed in involucres. Some species grow on the margins, some at the bottom, of lakes and pools, others in ditches and swampy places. A very limited order.

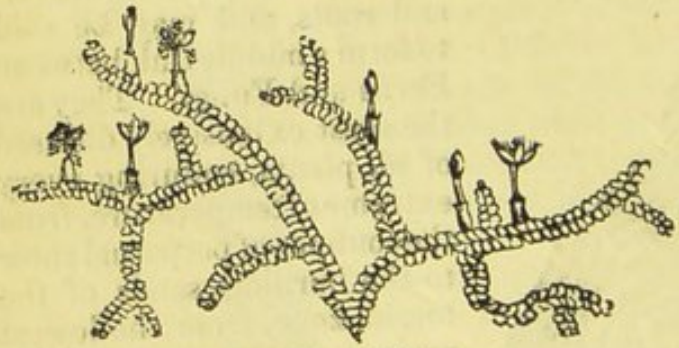
5. Musci (Mosses). This is the lowest order of plants which possess distinct stems, leaves, and roots, and may be said to form a middle link between Ferns and Fungi. They are the most extensively diffused of all plants, enduring every extreme of temperature, from the confines of perpetual snow to the burning sands of the torrid zone, from the lowest ravines to the greatest altitudes, and are but little dependent on soil for their sustenance, which they derive chiefly from the carbonic acid and moisture of the atmosphere. Their tenacity of life is not the least remarkable of their valuable qualities: they

Hypnum castrensis, or Feather Moss.

have been known to revive and suddenly present a verdant carpet, after having been apparently dried up for years. Their minute impalpable sporules, wafted afar by the wind, propagate the race where vegetation seems all but unaccountable. Bare rocks raised from the bosom of the sea, and fresh torrents of lava, become suddenly covered with Mosses and their allies the Lichens; and these by successive growth and decay produce a rich vegetable mould, and so prepare the way for higher forms of vegetation. This beautiful provision of Providence is eloquently illustrated by Humboldt in his 'Views of Nature' (Bohn's edit. p. 214, &c.)

6. HEPATICÆ (*Liverworts*), including JUNGERMANNIÆ, or *Scale-mosses*. This group forms a very natural link between the Mosses and the Lichens; its higher forms, the *Jungermanniæ* or Scale-mosses, approach the Mosses, whilst its lower forms, the *Marchantiaceæ* or true Liverworts, which grow in the form of green incrustations, are nearly allied to the Lichens. The *Marchantia polymorpha* is the most common of the species, and is usually found growing on damp walls, on the surface of the mould in garden-pots, and in the chinks between paving stones. The *Jungermanniæ* are creeping moss-like plants, of which a few species are found in Britain, in damp situations, on the trunks of trees, the surface of rocks, or the humid earth. Though their appearance is extremely insignificant, the beauty of their structure repays an attentive examination. They are interesting objects for the microscope, especially their fructification. The title of *Liverworts* seems to have been acquired from some fancied resemblance between the lobed thallus of *Marchantia* and the form of the human liver. In former times such resemblances were greatly observed by physicians, who termed them Signatures. They were supposed to indicate some special virtues in the cure of liver diseases.

Marchantia polymorpha.



Jungermannia, or Scale-moss.

One very curious feature in the *Marchantia polymorpha* is its curious basket-like apparatus for the production of small leafy

bodies, which spontaneously separate from the parent structure, and develope themselves into new beings. When mature they are liable to be washed out of their receptacle by the rain, and to be floated away to some other locality, where they grow very rapidly as long as supplied with water.

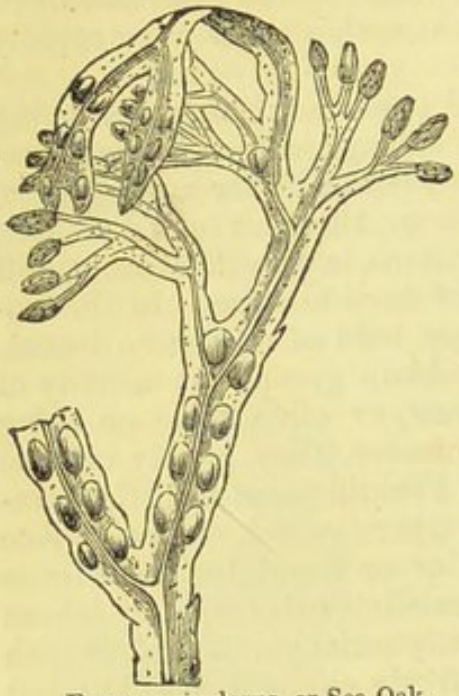
7. Lichens. A very extensive and important group, consisting of variously shaped minute plants of slow growth and long duration, usually spread over rocks, walls, stones, palings, the bark of trees, &c., in dry situations, in very thin layers, and generally of hard texture. In the tropics they lay hold of evergreen leaves. They are seldom green, but usually of a stone, straw, or olive tint; on being rubbed, however, they mostly become greenish. Fructification in little wart-like bodies (spore-cases), on the surface of the thallus or frond, but sometimes on an intermediate substance. Lichens are essentially aerial plants, and flourish best when freely exposed to light; but they shun the rays of the noon-day sun, and prefer a northern aspect. Like the Mosses and Liverworts, they clothe the bare rocks of newly formed islands, and do not grow on decayed matter, giving way in this respect to Fungi. Their tribes have been fancifully termed by Linnæus, *Servi*, servants or workmen, as they seem to be the primitive labourers in paving the way for settlers, by producing vegetation and soil in newly formed countries.

Lichens.

Besides this important office on the economy of Nature, some of the Lichens are peculiarly useful to man. The valuable purple dye termed *Orchil*, or *Litmus*, which is changed to bright red by the action of acids, is obtained from several species growing in the Canary Islands. The Laplanders depend on a Lichen, commonly known as the Reindeer Moss, for their subsistence, as it supplies the animal on which they depend with food throughout their dreary winter; its vegetation not being checked by the snow, beneath which it grows freely. A Lichen growing on the rocks of the Arctic regions afforded subsistence for many days to some adventurous explorers, when other provisions could not be obtained.

8. Algæ and Characeæ (Sea and Fresh-water weeds). This extensive class comprises a great variety of groups, ranging from the most simple types of vegetable existence to structures of con-

siderable complexity. The chief bond of connexion between them all is their aquatic habitation, and the absence of any other tissue than the simple cellular structure of their composition, every cell being a distinct organism. They are variously coloured, from pale hues, almost white, to brilliant bright red and intense black; but the general colours are green, brown, and red.



Fucus vesiculosus, or Sea Oak.

The fructification is usually imbedded in the substance of the frond, and microscopic. Their peculiar nomad or cellular mode of reproduction may be seen in Carpenter's 'Vegetable Physiology,' and his work on the Microscope.

It may be worthy of remark, that breaking up a Sea-weed into fragments will not destroy its vitality, as every part is complete in itself, and possesses reproductive powers.

Some Algæ attain a prodigious extent of development, forming vast submarine forests of the most luxuriant vegetation. Thus the *Chorda Filum*, found in the North Sea and near the Orkneys, reaches forty feet in length, and sometimes forms a kind of meadow, dangerous to swimmers, and through which a boat passes with difficulty; the *Macrocystis pyrifera*, by some very significantly called the *Fucus giganteus*, is reported to be from 500 to 1500 feet in length; and another species, in the tropics, attains the length of thirty feet, and the thickness of a man's thigh. But perhaps the most formidable is the *Sargassum*, or *Gulf-weed*, which floats on the surface of the Gulf of Mexico, extending for miles, so as seriously to interfere with the progress of a ship; it was this weed which alarmed Columbus and his crew, on his first voyage of discovery.

Alaria esculenta, called "Badderlocks" and Honey-ware.

The mischiefs inflicted by Algæ are amply indemnified by their utility to man. They supply food to a large

number of marine animals, and even cattle have been profitably fed on them, especially in the vicinity of the northern shores. The *Alaria esculenta*, called in Scotland *Dulse*, and in the Orkneys *Honey-ware*, furnishes a wholesome and palatable food for man throughout the northern regions; the *Rhodomenia palmata* is a palatable food to the poor, both in Ireland and Scotland, and the basis of one of the soups (*i. e.* St. Patrick's) invented by M. Soyer. Other species, in various parts of the world, are reckoned luxuries, whether cooked or used as salads. That great Chinese delicacy, the edible bird's nest, which is sometimes sold for its weight in gold, is merely a Sea-weed broken into a gelatinous pulp by a bird resembling our swallow.

It is a curious circumstance that some species grow on the surface, some beneath the tide-level, some possibly at a still greater depth, and some on rocks seldom covered by water.

Amongst the lower forms of this order are the PROTOPHYTES, comprehending the green slime found on damp rocks and walls, and the so-called *Gory-dew*, *Red Snow*. The growth of the latter is so extremely rapid, as to have led to the belief that it falls from the sky. It is of the very simplest formation, and consists of only a single cell. A large number of these are commonly found together, but each is a distinct individual. When it arrives at maturity, a number of minute granules may be seen within it, which are the germs of new plants, and by a spontaneous subdivision of these the parent-cell goes through precisely the same changes. This primary or nomad form is generally held by naturalists to be the boundary of the vegetable kingdom, while the *Protozoa*, another nomad form, which to the naked eye has the appearance of living jelly, is assumed to be the boundary of the animal kingdom. But which is vegetable and which animal, is, and long has been, a debateable question.

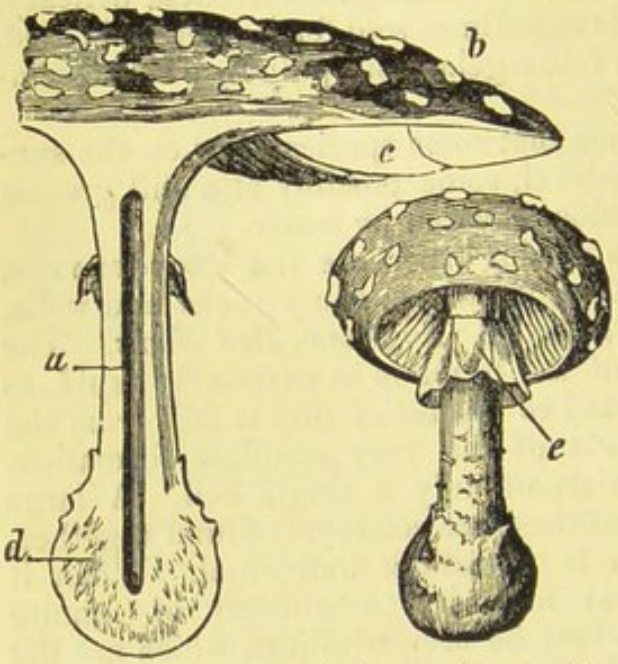
Protococcus nivalis, or Red Snow, highly magnified, showing its separate cells or vesicles partly imbedded in a slimy jelly.

The CHARACEÆ, sometimes called "Stone-worts," are an interesting little tribe of fresh-water plants, very simply organized, but with fructification assimilating to the higher orders of Cryptogamia, and even flowering plants. (Botanists used formerly to place them in MONŒCIA, *Monandria*.) They have mostly a stony, mineral incrustation; in some species so complete as to retain their form after the vegetable matter is decomposed. In the fens of Cambridgeshire the Characeæ are depositing year by year earthy matter in such abundance as to solidify and elevate the low and swampy soil.

Sea-weed is of great commercial value, on account of the barilla

which is yielded by its burnt ashes, from which we obtain alkali and soda; and especially for its Iodine, of late an important ingredient in both medicine and photography. From one species the Chinese obtain varnish, glue, and a valuable kind of putty or cement, all of which, when once dried, are impervious to water.

9. Fungi (Mushrooms, &c.) The plants of this extensive family, the lowest, but perhaps most numerous in the scale of vegetables (for there are supposed to be 8000 species), are for the most part either parasitic or dependent on decayed or decomposing organic matter for the means of their development, in which respect they differ from Lichens, which generally grow upon the bark of trees. They vary very much in form, size, colour, and duration; generally singular in structure; oftener minute than conspicuous, though some forms are large; of almost all hues excepting green, which they are but rarely; and generally of rapid growth and very short-lived, sometimes lasting less than a day. Their construction is cellular and very simple; leaves and flowers are absent, but there is, in the place of anthers, a scattered external or internal powder. The place of pistils is supplied by organs variously constructed, in which the spores or germinating bodies are lodged. Of all the Cryptogamia the Fungi are the most important to man; for though in many ways they prove highly injurious, especially the microscopic kinds, the benefits they confer, by their purifying powers, in absorbing putrescent matter, far outweigh their occasional devastations. To Fungi may be justly applied the designation which has been conferred upon insects—that of the "Scavengers of Nature;" for, like insects, they labour with most astonishing effect in the removal of decaying substances, both animal and vegetable, which if left to putrefy would in many instances become prejudicial, if not destructive to health. They multiply and spread with enormous powers of progression when their labours are called for by certain conditions, and retire with

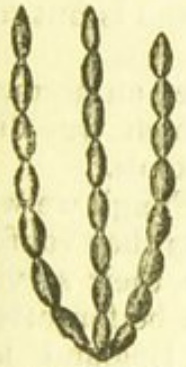


Amanita muscaria: *a*, the hollow stipes or stem; *b*, the pileus or cap; *c*, the lamellæ or gills; *d*, the volva or wrapper; *e*, the velum or veil.

equal speed when they have performed their allotted task, remaining dormant to reappear at a moment's notice when required.

The impalpable sporules of Fungi seem to be always floating in the air, ready to fasten and vegetate on anything which is congenial to their fructification, and we are always breathing them. They are the scourge of uncleanliness, and may be said to perform the duties of a sanitary commissioner.

As an example of the disseminating power of Fungi, we may instance the Lycoperdon, or Puff-ball (sometimes called the Devil's Snuff-box), which has been found to contain more than ten millions of dust-like seeds; these, on the bursting of the ball, spread through the air, floating on it like a mist. This singular plant has been known to grow in one night from an almost invisible speck to the size of a large gourd, 18 inches in diameter, and 20 pounds weight. No other living beings have such powers of multiplication. Nor are their powers of redintegration much less remarkable, for if a growing plant be slit down its centre with a knife, the parts will speedily coalesce and heal with a slight seam.



Common Blue Mould, greatly magnified; its stems consisting of single cells, loosely jointed together.

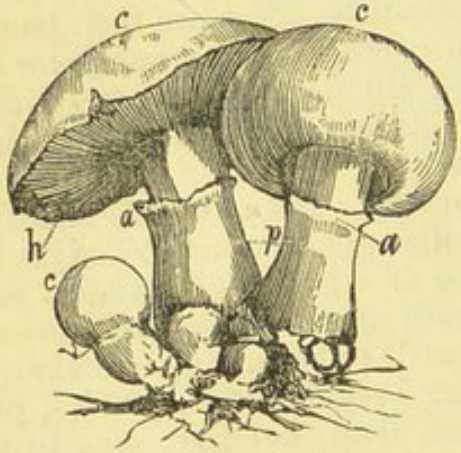
Of the inconveniences and mischiefs of Fungi examples are familiar to every one. The farmer finds them in his fields, in the form of *ergot*, *blight*, *mildew*, *rust*, *smut*, *bunt*, &c., and even on the hoofs of his horses and horns of his cattle; the cook or housekeeper in her bread, cheese, pickles, preserves, fruit, ketchup, &c., in the form of *mould;* the ship-owner and householder in the *dry-rot*, which, if it once gets a footing, loses no time in completing its havoc. Indeed, almost every earthly thing is liable to some kind of fungus; even the teeth, where not kept well cleaned, the lungs, and wounded flesh of living men, produce them; and they are found growing in the living bodies of silkworms, caterpillars, wasps, and certain tropical flies; and on living plants, as we see in the annexed figure of the *Accidium cancellatum*. When our beer becomes "mothery," the mother is a fungus; and when our

Fungus (Accidium cancellatum) growing on a leaf.

nuts are powdery and bitter, the mischief is a fungus. They even drink wine—a pipe at a time—as the late Sir Joseph Banks, the eminent naturalist, has recorded in an amusing story. He says that he locked up a pipe of new wine in a spare cellar, that it might mature, and at the end of three years, supposing that time had then done its work, proceeded to try it. But the door refused to open, and had to be cut away; when the cellar was found to be literally full of a fungous growth, which had carried the cask to the ceiling, and there held it fast, having drained its contents. This fungus, called *Racodium cellare*, is the black fibrous substance which festoons our wine cellars and bottles, and is but too well known in the London Docks.

Dr. Carpenter, in his 'Vegetable Physiology,' gives an account of a paving stone, weighing eighty-five pounds, which was displaced and raised an inch and a half by some Toad-stools.

Having said enough of the mischiefs produced by Fungi, we will now inform our fair readers of a few of the benefits they confer.



Agaricus campestris or Mushroom: *p*, the stalk or stipes; *c*, cap or pileus; *v*, the veil or velum; *a*, the annulus; *h*, lamellæ radiating under the cap covered by the hymenium.

In the first place, their service as food must not be forgotten, and though in England not one in ten of our esculent species is brought to table, the case is very different in other parts of the world. We cultivate principally the following: the common Mushroom (*Agaricus campestris*), which the cook, besides making ketchup of it, dresses in fifty different ways; the *Agaricus deliciosus* or Orange-milk Agaric, found in Scotland, Staffordshire, and Surrey; the esculent Morel (*Morchella esculenta*), which is used to enrich soups; and the Truffle (*Tuber cibarium*), which many consider a great delicacy. But abroad Fungi are treated as important food, and in some parts form the chief, if not the sole diet of thousands, who would else be scantily supplied. In Germany and Italy numerous species are sold in the markets, and in Rome they form so important an article of commerce, that a public officer, called "*Inspettori del Funghi*," is appointed to test all that are exposed for sale, and to collect a tax on them, which, though trifling in itself, produces several thousand pounds per annum. Some species are very large, weighing upwards of ten pounds; but the largest on record, is one mentioned by Clusius,

the botanist, as found in Pannonia, which sufficed to feed a large family, and then filled an ordinary chariot. We remember somewhere reading the story of an English traveller in the northern regions, who, after having at great trouble successfully collected a considerable variety of rare Fungi, found, one morning, that the servants at his inn had eaten them all up.

Besides their value as an article of food, Fungi are useful in the arts. One species is employed in making ink, several of the highly coloured ones (and some are very brilliant) make excellent dyes, some are used as German tinder, and one large tough species is a very good substitute for leather, and as such in some regions made into clothing. Other species are used in various ways in medicine, and of these there is one called *Fuh-ling*, which is as extensively used in China as Rhubarb in this country; others again, and among them the *Amanita muscaria*, figured at page 84, are resorted to for producing certain conditions of excitement or stupefaction, as we use opium and tobacco.

Vegetation of Yeast: *a*, single cells of which it at first consists; *b*, cells with buds; *c*, the same more advanced; *d*, rows of cells.

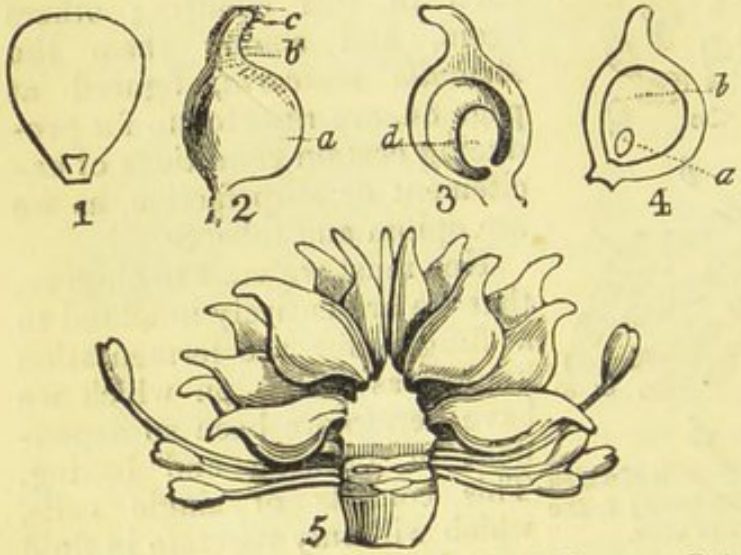
Nor must we omit to observe, that we are entirely indebted to a fungus for the fermentation known as yeast, on which we have heretofore been so dependent in brewing and baking. This consists of single cells, which will only vegetate in fluid containing organic matter in a certain state of decomposition. The progress is shown in the margin.

Identification of Species.

Having enabled the young student to find the Linnæan class and order of any flower, we will now point out the manner in which its genus and species are identified, and for that purpose select two common examples.

When the student has learnt the technical names of leaf and flower forms, she will be enabled, after a little practice, and with the occasional help of a botanical glossary or dictionary containing scientific terms, to identify most of the plants in a Linnæan Flora.

Our first figure is the *Ranunculus*, or Buttercup, which belongs to Class XIII, Polyandria, Order *Polygynia*, Genus Ranunculus, which is thus technically described:



Parts of the flower of the Ranunculus bulbosus, or Buttercup: 1, one of the petals, with the scale at the bottom on the inner side; 2, one of the carpels, showing *a*, the ovary, *b*, the pistil, and *c*, the stigma; 3, section of the unripe carpel, showing *d*, the ovule within it; 4, section of the mature carpel filled with the seed—*a*, the embryo, *b*, the albumen; 5, the carpels and some of the stamens, implanted on the receptacle.

Ranunculus Linn. (*Crowfoot*).

Generic description.—Calyx inferior, of five, rarely fewer, ovate, deciduous sepals; petals usually five, rarely eight or ten, roundish, shining. Nectary, a pore (or cavity) at the base of each petal; in some species covered by a scale. Filaments numerous; anthers linear or cordate, erect, two-celled; germens numerous, collected into a globular head; pistils none; stigmas small, reflexed; carpels numerous, ovate, tipped with a point or hook. Herbs mostly perennial, acrid, and more or less poisonous. Named from *Rana*, a frog, some of the species being aquatic.

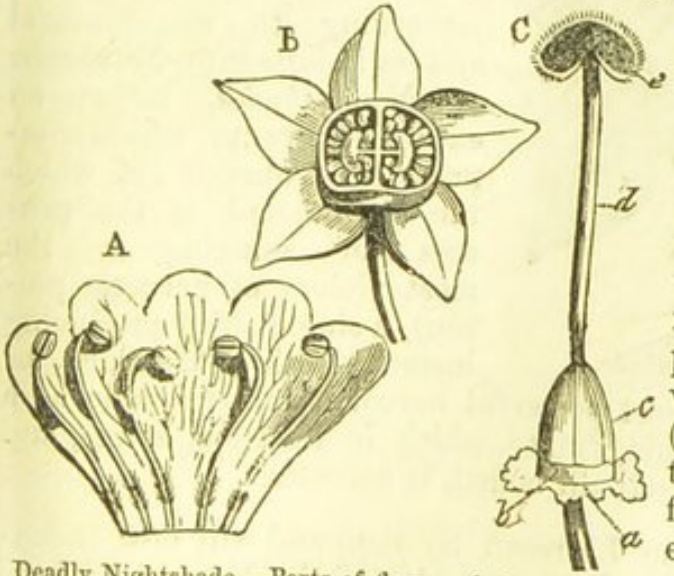
The above generic description applies to the whole Ranunculus tribe or genus, of which there are more than a hundred species. We will now give a botanical description of the *species* commonly called *Buttercup*.

RANUNCULUS BULBOSUS, *Bulbous Crowfoot*, or *Buttercup*.

Specific description.—Root bulbous,[b] solid, fibrous underneath;[a] Stem[d] erect, hairy, a foot high; lower[e] and root-leaves[c] compound, with cut leaflets; upper leaves[f] sessile, alternate; Stalks[d] furrowed; Flowers terminal, solitary, petals[h] golden-yellow, with nectariferous scales at the base; Calyx[g] reflexed, sepals ovate, concave, hairy. Perennial; grows in pastures and meadows; common in England. *Flowers from May to August.*

According to the Natural System, the order *Ranunculaceæ*, or Crow-foot tribe, includes the Anemones, Hellebores, Pœonies, Aconite, Clematis, Meadow-rue, Larkspur, and Flos Adonis.

CLASS V. PENTANDRIA, Order *Monogynia*, Genus Atropa.



Deadly Nightshade.—Parts of flower of the same: A, corolla cut open, showing the stamens inserted on it. B, calyx, with ovarium cut across. C, pistil, with *a*, origin of calyx; *b*, origin of corolla; *c*, ovarium; *d*, style; and *e*, stigma.

ATROPA, *Deadly Night-shade*.

Generic description.—Calyx inferior, permanent, deeply divided into five acute, somewhat unequal segments; Corolla monopetalous, the tube very short, limb tumid (swelling), ovate, longer than the calyx, with five shallow, nearly equal, marginal segments; Filaments subulate, spreading and curved above, nearly as long as the corolla;

Germen ovate, with a gland beneath; Pistil filiform, inclining upwards, as long as the corolla; Stigma knobbed; Berry globose, with two lateral furrows; Ovarium two celled; Seeds numerous, attached in each cell to a fleshy receptacle; Leaves alternate, undivided, or lobed. Herbaceous plants or shrubs. Natives of most parts of the world; named after *Atropos*, one of the Fates.

ATROPA BELLADONNA (*Common Deadly Nightshade*).

Specific description.—Stem herbaceous, three feet high, round, branched, slightly downy; Leaves ovate, undivided; Flowers solitary, stalked, dull purple. Perennial; found in hedges in England and most parts of Europe. *Flowers in June.* The whole plant is fetid and poisonous, and its beautiful berries, which are somewhat sweetish, have been the death of many children and ignorant people. But Hahnemann, the eminent homœopathist, says that they possess the property of protecting those who take them from Scarlatina.

Common Deadly Nightshade.

This is but a small genus, and is separated from several genera of great affinity, most of which, however, belong to the same Linnæan class. According to the Natural system it falls into *Solanaceæ* or *Night-shades*, rather an extensive group, which comprehends Tobacco (of which the oil inhaled in the process of smoking is the most violent of narcotic poisons, a single drop producing instant death); Henbane, or Hyoscyamus Niger (a most powerful narcotic, but valuable as a medicine); and our edible Potato, which in its stem, leaves, and berries, and indeed in itself till boiled, is narcotic.

We here conclude the Linnæan System, and will now endeavour to give the young student some idea of the Natural System, referring her to Dr. Lindley's 'Ladies' Botany,' and his larger work the 'Vegetable Kingdom,' or to Dr. Carpenter's 'Vegetable Physiology,' for further information.

THE NATURAL SYSTEM.

The arrangement of Plants adopted by Jussieu, and varied or amplified by Decandolle, Hooker, Lindley, and others, commonly called the *Natural System*, is not founded, like that of Linnæus, upon the number and modifications of stamens and pistils, but upon the resemblance of characters presented by all the parts of plants collectively; that is, upon their affinities according to their mode of growth, properties, and general similarity.

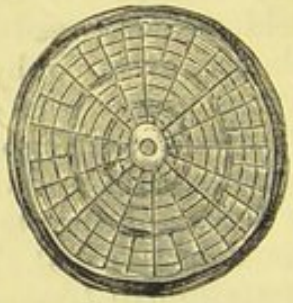
By this system all plants are divisible into three main classes, of which the first two are *flowering*, and the third *flowerless*. These three classes are scientifically termed—1. DICOTYLEDONS (flowering plants having two, and seldom more, seed-leaves, called lobes). These are all EXOGENS (that is, growing by addition to the outer part of the stem, and having pith in the centre united to the bark by medullary rays). 2. MONOCOTYLEDONS (flowering plants with only one seed-lobe). These are all ENDOGENS (growing by the addition of new wood to the centre of the stem). And 3. ACOTYLEDONS (flowerless plants without seed-lobes). These are all CRYPTOGAMS, and constitute the twenty-fourth Linnæan class just described. These three *classes* are divided into several *sub-classes*, which are again divided into *groups*, and these into *orders*, which are continually increasing and changing as the Natural System becomes developed. At present the orders number upwards of 320, each comprising various *genera* (that is, a cluster of plants visibly similar), and these again comprehending *species*. These subdivisions, although at first a little startling, are all comparatively simple when they are grasped; just as is the arrangement of a Grammar, where, under every general head, you find the parts of information belonging to it. Indeed, Linnæus compared the Vegetable Kingdom to a Geographical Map, in which the four quarters of the globe are supposed to correspond with *classes;* the kingdoms to *families* or *orders*, the provinces to *tribes*, the districts to *genera*, towns or villages to *species*, and houses to *individual plants*. It is quite obvious that all the systems of classification by which plants are marshalled into groups, according to some common property, are mere human inventions to facilitate their exact registration, as in any other catalogue. Hence systems will always be liable to differ somewhat according to the notions of the classifier. As Jussieu, Decandolle, Henslow, and Lindley are nearly agreed in respect to the main divisions, we here adopt a tabular outline in accordance with their arrangement, but have no space to show their minute subdivisions.

For a more complete illustration we must refer our fair readers to Dr. Lindley's 'Ladies' Botany,' where also will be found an artificial table for discovering with certainty the Natural order to which a given plant belongs.

TABULAR VIEW OF THE NATURAL SYSTEM.

CLASS I. DICOTYLEDONS, or EXOGENS. Flowering plants, of which the seeds split into two lobes in germinating, that is, their embryo consists of two (though sometimes more) opposite cotyledons; leaves reticulated (*i. e.*, net-veined); stem usually tapering and branching; bark, wood, and pith distinct (*as shown in section*). The floral parts in most instances quinary, that is, arranged in series of five or its multiple, but sometimes quaternary.

Dicotyledonous germination.



Exogenous stem.

Sub-Class.

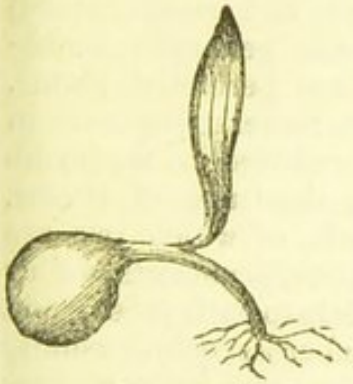
1. THALAMIFLORALS. — Polypetalous (petals distinct); stamens hypogynous (growing on the receptacle or thalamus); as the *Ranunculus*.
2. CALYCIFLORALS. — Polypetalous; stamens generally perigynous (growing on the calyx); as the *Rose*.
3. COROLLIFLORALS. — Monopetalous (petals united), with hypogynous stamens, as the *Convolvulus*.

(All Dichlamyds, that is, having both calyx and corolla.)

4. MONOCHLAMYDS (also called INCOMPLETE), having only a perianth or single floral envelope, which is sometimes wanting, as the *Marvel of Peru, Nettle, Rhubarb*.

All the above four sub-classes are ANGIOSPERMOUS, that is, their seeds are produced in a seed-vessel. Some systematists add here GYMNOSPERMÆ, or plants having naked seeds, of which the principal example is the Ord. CONIFERÆ, or *Pine family*, comprising the Firs, Cypress, Yew, &c.

CLASS 2. MONOCOTYLEDONS, or ENDOGENS. Flowering plants, with only one Cotyledon or seed leaf. Leaves narrow and with few exceptions parallel-veined. Stem simple (*i. e.*, not branching), generally herbaceous, as the *Lily* and *Grasses;* when ligneous, the wood, bark, and pith, seem intermixed, as the *Palm-tree* and *Yucca*. The floral parts are ternary, that is, arranged in threes or a multiple of three, rarely in twos or fours, and never in fives.



Monocotyledon. Cocoa-nut.

Endogenous stem.

Sub-Class.

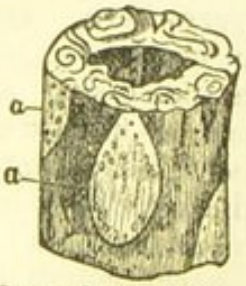
1. DICTYOGENS. Broad leaves, with branching nerves, as the *Yam,* and *Herb Paris.* This is a very limited group.
2. PETALOID. Having the segments of the perianth in one or two rows, the Calyx not clearly distinguishable from the Corolla, either by colour or form, as the *Crocus.*

*** *Some divide this sub-class into* EPIGYNOUS *(ovary below the flower), as in* Orchids *and the* Snowdrop; and HYPOGYNOUS *(ovary above the flower), as in the* Lily *and* Tulip.

3. APETALOID. Having no true perianth, or with only a few whorled scales, as the *Wake-robin* and *Duckweed.*
4. GLUMACEOUS. Perianth consisting of imbricated or chaff-like scales, as the *Sedges* and *Grasses.*

CLASS 3. ACOTYLEDONS, or CRYPTOGAMS (also called Cellular plants). Having no Cotyledons or perceptible flowers.

Acotyledon. Conferva.



Stem of a Tree-fern. *a a*, scars of leaves.

Sub-Class.

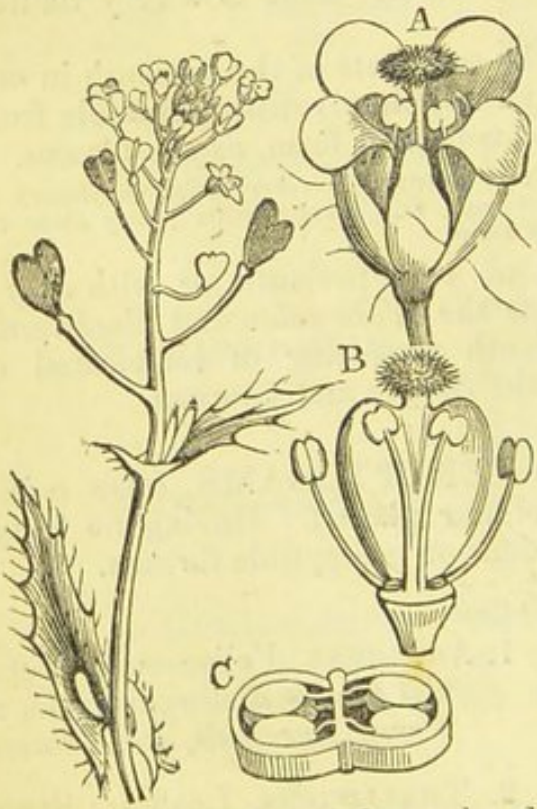
1. ACROGENS. Foliaceous; Stems and leaves distinguishable, as *Ferns, Lycopods,* and *Mosses.*
2. THALLOGENS. Leafless; Stems and leaves indistinguishable, as *Algæ, Fungi,* and *Lichens.*

DICOTYLEDONS, or EXOGENS.

Sub-Class 1. THALAMIFLORALS.

Ord. CRUCIFERÆ, or *Cruciferous tribe,* also called BRASSICACEÆ, or *Cabbage tribe.*

The *Cruciferæ* form one of the largest and most natural families of the vegetable kingdom, and are generally herbaceous, annual, or biennial, through sometimes perennial plants, with alternate leaves, and no stipules; the flowers disposed in spikes or racemes, generally very short, or reduced to a corymb when the flowering commences; uniformly destitute of bracts. The *Calyx* is formed of four deciduous sepals, of which two are often gibbous or bulging at the base. The *Corolla* consists of four unguiculate (or stalked) petals, in pairs (opposite to each other), and alternate with the sepals, forming an equilateral cross; colour usually yellow or white. *Stamens* six, tetradynamous, two being shorter than the rest. At their base, on the receptacle, are two or four green glands, one between each pair of long stamens, and a larger one under each of the lateral stamens. *Ovarium* generally two-celled; *Style* short, terminated by a two-lobed stigma. The *fruit* is sometimes a siliqua, sometimes a silicula, two-celled, two-valved, each cell containing one or more seeds attached to the outer edge of the membranous dissepiment (partition). The *seeds* have no albumen; the *embryo* is curved upwards towards the margins of the cotyledons, or against the back of one of them.



Shepherd's Purse.—A, whole flower enlarged; B, stamens and pistil; C, horizontal section of ovarium.

A good example of this order is given in the annexed figure of our common weed, the Shepherd's Purse (*Capsella Bursa Pastoris*) which may be found almost everywhere. Its name seems to have been derived from its possessing a number of pouches filled with very small seeds, which might be imagined to be fairy coins. It is remarkable that, whilst the characters of the order are very constant, those of the

individual are liable to great variation. This is evident in the several species which are cultivated for the beauty of their blossoms, such as the *Stock* and *Wallflower;* as long as these flowers remain single they are not esteemed by the florist, but their tendency to become double, by the development of petals in the place of stamens and pistils, gives them value. Rich soil will always tend to develop double flowers; but seeds sown in a barren place, like that which the wild plants inhabit, will generally produce single flowers of the parental character. It is this tendency to variation, under the influence of cultivation, which renders other plants of this order valuable to man as articles of food.

All the *Cruciferæ* are more or less acrid and stimulant; but cultivation, by increasing their mucilaginous juices, diminishes their acrimony, so that some species become nearly destitute of it, as is the case with the numerous varieties of the cabbage and turnip. Indeed none of the plants of this order can be called poisonous, and in reference to this fact there could scarcely, perhaps, be mentioned a more striking illustration of the practical utility of the Natural System than an instance which occurred at the beginning of the last century. During Lord Anson's voyage round the world a very large proportion of his crew either lost their lives, or were rendered unfit for service, by the scurvy; and although new and unknown lands, teeming with luxurious vegetation, were constantly being discovered, the dread which the surgeon entertained of the men being poisoned was so great, that he would often not allow them to use any other kind of fresh vegetable food than grass. If he had been acquainted with the simple fact, that none of the Cruciferæ are deleterious, and that all possess, in a greater or less degree, those properties which render them more valuable than ordinary medicines in the treatment of this disease, he might have been able to restore many to health by simply explaining to them the very evident marks by which this order is characterised, and encouraging them to seek for plants which exhibit such, and to make use of them without apprehension.

This order, so important to man in respect to the amount of wholesome food which he directly or indirectly derives from it, comprehends upwards of 1700 species, among which are the *Turnip, Cabbage,* in all its numerous varieties (*Scotch Kale, Savoy, Broccoli, Cauliflower,* &c.), *Sea Kale, Mustard, Cress, Radish, Horse-radish, Pepper-wort, Water-cress, Scurvy-grass,* and *Rape;* also the following ornamental garden plants: *Stocks, Wallflowers, Candy-tufts, Alyssum, Arabis, Königa, Honesty,* and *Rocket.*

Sub-Class 2. Calyciflorals.

Ord. Myrtaceæ. *The Myrtle Tribe.*

One of the most natural and easily recognised tribes of plants, consisting of trees or shrubs, with entire, exstipulate, usually opposite, and dotted leaves, with an intramarginal vein. *Calyx* adherent, cleft; but sometimes operculate (opening by a lid). *Petals* four or five, sometimes none; *Stamens* usually either twice as many as the petals, or indefinite, with long filaments, and ovate anthers. *Style* simple. *Fruit* baccate (berry-like) in true Myrtæ, and capsular in Leptospermæ. *Seeds* usually numerous, exalbuminous (without separate albumen). The plants of this order are tropical and sub-tropical, generally aromatic, and yield a pungent volatile oil. Some of them are astringent, others produce gummy and saccharine matter. The unexpanded flower-buds of *Caryophyllus aromaticus* constitute the Cloves of commerce. *Eugenia pimenta* bears an aromatic fruit, which, when dried, constitutes *Pimento*, or Jamaica Pepper; and *Eugenia ugni* is now gaining reputation as a pleasant fruit.

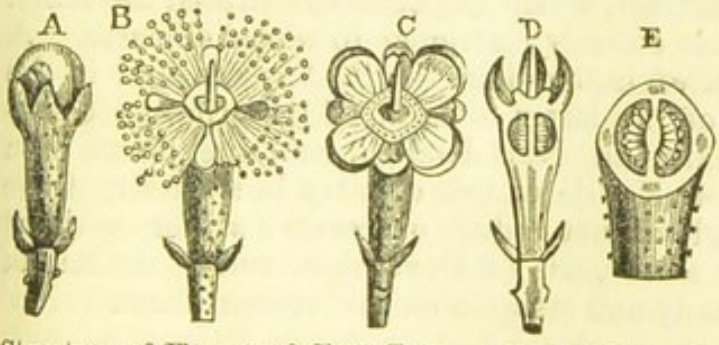
The leaves of the Myrtle and its allies are characterised by the same peculiar structure as that of the Orange, being studded closely with little receptacles, which contain a volatile oil; so that, if held up to the light, they look as if pierced with holes closed up by a green transparent substance; and if bruised they emit a fragrant aromatic odour.

In the *Myrtus communis*, or Common Myrtle, the calyx consists of five sepals, which adhere so as to form a tube; and within this there is a corolla consisting of five small petals. Within the corolla, we find a considerable number of stamens, inserted on the summit of the tube of the calyx; their number is generally a multiple of that of the sepals, and they are sometimes united into bundles. The ovary of the Myrtle is divided into three cells, each of which contains a good many ovules; on this is mounted a single style, which ends in a very small stigma. The fruit is a purple berry, very much resembling that of the Fuchsia; but it contains only three cells, while the latter has four.

In some of the *Myrtaceæ*, the ovary is only two-celled, whilst the parts of the flower are arranged in fours. This is the case with the *Caryophyllus aromaticus*, just mentioned. This tree is a native of the Moluccas and other islands in the Indian Ocean, from which it has been transported to several parts of the continent of Asia, and also to the West Indies. It is only within a very limited

range of climate, however, that the Clove acquires its full aromatic flavour, so as to be useful as a spice; for even when grown in Cochin-China, and many other places, it is almost tasteless. The Clove has been known in Arabia from the earliest ages; and it was introduced into the European market nearly 2000 years ago. Up to a comparatively recent period, however, the source from which it was obtained was not known to Europeans. Early in the 16th century, the Moluccas were discovered by the Portuguese, and were soon afterwards taken from them by the Dutch, who endeavoured to monopolise the growth of the Clove, and to regulate the quantity which should be supplied, by cutting down or planting trees, according to their own supposed interests. This system more than once occasioned an insurrection among the natives, who regard the Clove-trees with great attachment, and who are in the habit of planting one at the birth of each child. Every part of the Clove-tree abounds with aromatic oil, one of the few essential oils that are heavier than water. The average annual crop of Cloves is from 2lbs. to $2\frac{1}{2}$lbs. from each tree; but a fine tree has been known to yield 125lbs. in one season; and as 5000 Cloves only weigh one pound, there must have been at least 625,000 flowers upon this single tree. The quantity imported into Britain in 1839 was upwards of 367,000lbs.

Branch of Clove Tree, with Flowers and Buds.



Structure of Flowers of Clove Tree.—A, bud or Clove. B, the flower expanded, showing the stamens in four bundles. C, flower with stamens removed, showing the calyx and corolla, each consisting of four pieces. D, vertical section of ovarium. E, horizontal section of ovarium.

Several other species of this order have aromatic properties, and yield products which are valued as spices. This is the case with

the PIMENTO, the berries of which are known under the name of *All-spice*, from being considered to unite the flavour of the clove, cinnamon, and nutmeg. They yield an oil which much resembles that of cloves. The pleasant fruits called the *Rose Apple* and the *Jamrozade* of the East Indies, and the *Guava* of the West Indies, are the succulent berries of shrubs of the Myrtle tribe; as is also the *Pomegranate*, which was originally a native of Barbary, but has now migrated to Europe. The volatile oil of *Cajeput* is distilled from the leaves of an Indian species, called *Melaleuca minor*, and has long been known as a valuable external application in rheumatism, and, for a short time, enjoyed the reputation of being a specific for the Indian cholera. The leaves of another species are used by the Malays as tea.

There is a remarkable division of the Myrtle tribe, in which the fruit is dry, instead of being a berry, and opens at the top. The greater part of the species belonging to it are natives of New Holland; and amongst these may be specially mentioned the *Eucalyptus*, or Gum-tree. This is destitute of corolla; and the calyx has the sepals adherent very closely together, so as completely to envelop the stamens. When these expand, however, the upper part of the calyx separates from the lower, and is carried off upon the top of the stamens, very much in the manner of the *Escholtzia*. The *Eucalypti* are distinguished for their astringent principle, which in the form called *tannin* is extracted from their bark, and used in the manufacture of leather. An Indian species affords an astringent extract, which has been substituted for Kino.

This order is almost entirely restricted to warm climates. A large number of species is found in South America and in the East Indies; whilst, of the latter division of the group, a considerable proportion exists in New Holland and the South Sea Islands. The common Myrtle of this country is a native of the South of Europe; and will not endure our severe winters without protection, except in some parts of Devonshire and in the Isle of Wight, where it is hardy and assumes an arborescent form.

Sub-Class 3. COROLLIFLORALS.

Ord. BORAGINACEÆ. *The Borage Tribe.*

Herbaceous plants or shrubs. *Stems* round. *Leaves* alternate, often covered with asperities, consisting of hairs proceeding from an indurated enlarged base. *Flowers* in involute spikes, or racemes, sometimes solitary and axillary. *Calyx* persistent, with four or five divisions. *Corolla* hypogynous, monopetalous, generally regular, five-cleft, sometimes four-cleft. *Stamens* inserted upon the corolla, equal to the number of its lobes, and alternate with

them. *Ovary* generally four-parted, four-seeded; ovules attached to the lowest point of the cavity. *Style* simple, arising from the base of the lobes of the ovary. *Stigma* simple or bifid. *Nuts* two or four, distinct. *Seed* separable from the pericarp, destitute of albumen. *Embryo* with a superior radicle; *Cotyledons* parallel with the axis, plano-convex, sometimes four, as in *Amsinckia.*

Boraginaceæ.
Heliotrope.

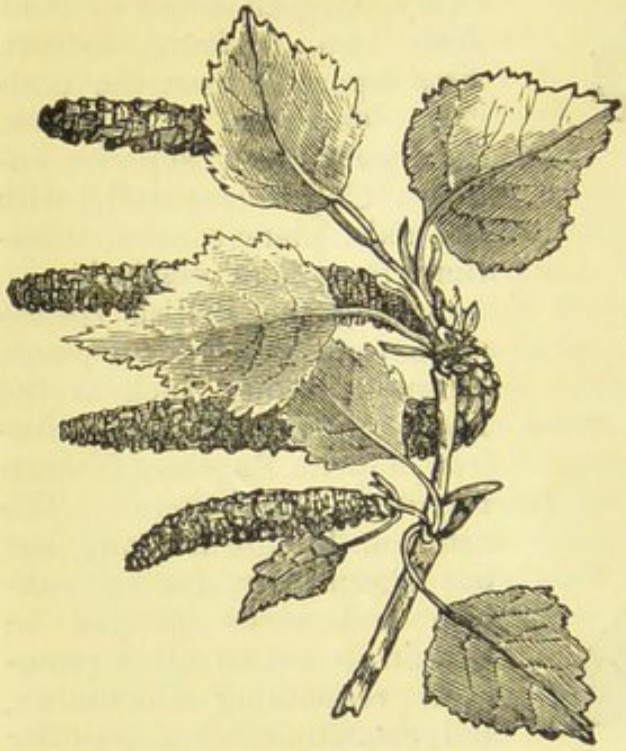
Among the British species are several well-known plants of great beauty, such as the Forget-me-not (*Myosotis palustris*), Viper's Bugloss (*Echium vulgare*), and others. The common Borage is found, but not abundantly, among rubbish and waste ground in Britain; it has an odour somewhat resembling Cucumber, and communicates a peculiar coolness and flavour to any beverage in which it is steeped. In common with several other species of this order, it contains a small quantity of nitre, together with a large amount of mucilage; and it is not unfrequently used as a domestic remedy. The common Comfrey (*Symphytum officinale*), growing on the banks of rivers and in watery places, also abounds in mucilage; and its young leaves, when boiled, are sometimes used as a substitute for Spinach, and its stems eaten like Asparagus. In several species of this order, the roots contain a reddish-brown colouring matter, which is extracted for the use of dyers; the one chiefly cultivated for this purpose, is the *Anchusa tinctoria*, or Alkanet, the produce of which is largely employed in this country.

Sub-Class 4. Monochlamyds.

Amentaceæ, or *Catkin family.*—Ord. Betulaceæ, *or Birch tribe.*

Trees or Shrubs. *Leaves* alternate, simple, with the primary veins often running straight from the midrib to the margin; *stipules* deciduous. *Flowers* amentaceous (having catkins), with small scales for their *calyx*, which are sometimes arranged

in a whorl, so as to appear like a real calyx. *Stamens* distinct. *Anthers* two-celled. *Ovarium* free, two-celled; ovules solitary, pendulous, inverted; *style* single, or none; *stigmas* two. *Fruit* thin, dry, indehiscent, one-celled, combined with the scales into a sort of cone. *Seeds* pendulous; albumen none; *embryo* straight; *cotyledons* flat; *radicle* superior.



Catkins, or *Amenta*, of Birch.

Specific description.— Betula alba (Common Birch). — *Leaves* ovate-deltoid, acute, doubly serrated. *Fruit* broadly obovate, with a broad margin. There is a variety of this tree with pendulous branches, which are more verrucose (covered with wart-like excrescences) than the common kind. The *bark* is generally smooth, silvery white, and inclined to peel off in membranaceous layers.

The different species of Birch are mostly timber-trees; more valued for their decorative character in a landscape than for their wood, which is often light and of inferior quality. The *Black Birch* of North America, however, is one of the hardest and most valuable woods we know, and yields a balsamic oil as also a resinous substance called Birch-camphor. The oil extracted from the Common Birch is employed in dressing Russia leather, and gives it its peculiar smell; and the sap drawn from it in spring, when it is very saccharine, not only furnishes sugar, but is converted into an agreeable, sparkling wine, much valued in the North of Europe. But the most familiar, and not the least useful, application of Birch, is in the form of rods and brooms.

MONOCOTYLEDONS, or ENDOGENS.

Sub-Class 2. Petaloids (Epigynous).

Ord. Orchideæ.— *Orchid Tribe.*

Terrestrial or epiphytic herbs or shrubs, with fibrous or tu-

berous roots, a short stem, or a pseudo-bulb, entire, often sheathing leaves, and singular, showy flowers; always perennial, and occurring all over the world in temperate climates. The *perianth* consists almost invariably of six segments, in two rows, three outer pieces belonging to the calyx, and three inner belonging to the corolla; the lowest generally differing in form from the rest, and often spurred; this is called the *labellum*, or lip, and has sometimes three marked divisions. Essential organs united in a common column. *Stamens* three, *anthers* two, four or eight-celled. *Ovarium* one-celled. *Fruit* usually a three-valved capsule, sometimes baccate; *seeds* exalbuminous; *embryo* solid and fleshy. But the most distinguishing peculiarity of this tribe is that modification of the special organs of fructification which Linnæus named *gynandrous*, and made the characteristic of his twentieth class. Out of this very extensive order, supposed to comprise more than three thousand species, only forty-one are British.

Aerides Arachnoides.

The plants associated with the common *Orchis* in this order, exhibit some of the most curiously interesting variations of structure that any group in the vegetable world affords. Some are very fragrant, and most of them are remarkable for the resemblance between their oddly-shaped flowers and various objects in the animal kingdom; thus, two species of this country are named the Bee-Orchis and the Fly-Orchis, from the similitude of their flowers to those insects; whilst others are known as the Man-Orchis, the Lizard-Orchis, and the Lady's Slipper. In some

foreign species there is an equally strong resemblance to large and splendid Butterflies and other insects; one reminds the observer of a grinning monkey, whilst another resembles an opera-dancer suspended by the head. The accompanying figure represents the Spider-Orchis, in which the likeness to the body of that animal is very striking. The Orchideæ of Europe grow on the ground, in meadows, marshes, or woods; and they are justly considered as among the most curious and beautiful plants of its Flora. But it is in tropical countries, in damp woods, or on the sides of hills, in a serene and equal climate, that they are seen in all their beauty. Seated on the branches of living trees, or resting among the decayed bark of fallen trunks, or running over mossy rocks, or hanging above the head of the admiring traveller, suspended from the gigantic arm of some monarch of the forest, they develop flowers of the gayest colours and the most varied forms, and often fill the woods at night with their mild and delicate fragrance. For a long time such plants were thought incapable of being made to submit to the care of the gardener; and Europeans remained all but ignorant of the most curious tribe in the whole vegetable kingdom. But it has been discovered of late years that, by care and perseverance, they may be brought to as much perfection in a hot-house as they acquire in their native woods; and they now form the pride of the best collections in England. It is chiefly in the almost impenetrable forests of South America that the *epiphytic* species (those which grow upon the surface of trees) are found; but in the hot, damp parts of the East Indies, other kinds are very abundant. Some epiphytic species are known as air-plants, from their power of vegetating when simply suspended in the air, without any soil or any direct supply of water, supported only by the moisture of the atmosphere; so that, when hung up by strings from the ceiling of

Spider-Orchis.

a room, they will live for weeks and even months, and will go on blossoming luxuriantly. Hence they are among the most favorite ornaments of the houses in China and Japan, of which countries they are natives.

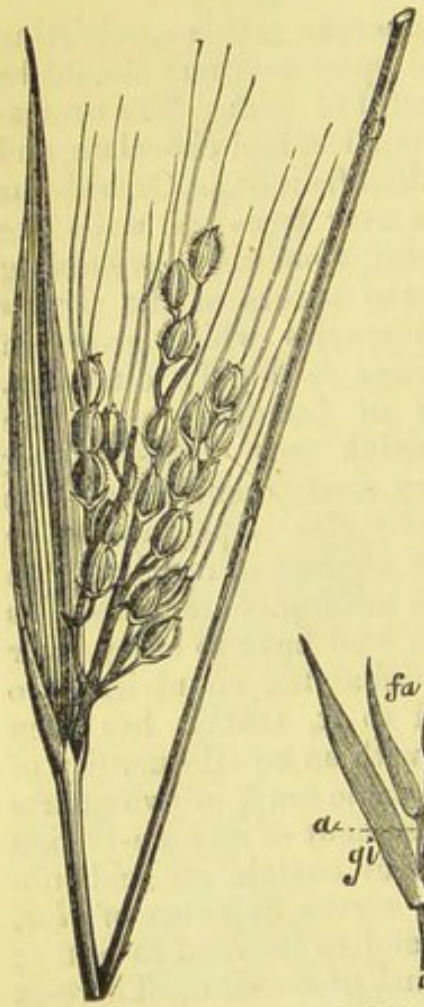
It is remarkable that in a group so numerous as this—consisting as it does of nearly two thousand known species—there should be so few species possessed of properties useful to man. The aromatic substance called *Vanilla*, used to flavour ices and chocolate, and sometimes to perfume snuff, is the succulent fruit of an Orchideous plant, which, in the West Indies, creeps over trees and walls like Ivy. A nutritive substance termed *Salep*, somewhat resembling Arrow-root or Sago, is obtained from the tubers of the *Orchis mascula*, a British plant, as also from a species which grows in Turkey and Persia, where this beverage is highly esteemed. It used to be sold about the streets of London, under the name of *Saloop*, and was a favorite drink with hard-working people, by whom it was considered very strengthening; and its present comparative disuse in favour of coffee is perhaps to be regretted. It is said to contain a greater amount of nutriment in the same bulk than any other vegetable substance; and for this reason it is much employed by travellers, who have to carry their supplies with them into deserts and uninhabited countries. So high a nutritive power has been assigned to it, that it has been asserted that one ounce of Salep, boiled with an equal quantity of the stiff glue or animal jelly known as portable soup, in two quarts of water, will suffice for the daily nourishment of an able-bodied man. Some of the South American species contain a viscid substance, which, when separated by boiling, serves as a sort of *glue*, sufficiently strong to cement porcelain, and to be used as putty; and some species are said to have medicinal properties. There is scarcely any other way in which Orchids are of direct utility to man; but that mind must be very unpoetical which is not touched with the fairy-like appearance of these lovely plants.

Sub-Class 4. GLUMACEÆ.

Ord. GRAMINEÆ, or *Grass-tribe.*

Herbaceous plants, with round, hollow, jointed stems; narrow, alternate, sheathing leaves, the sheath split, often with a ligule at its summit; *flowers* usually hermaphrodite, sometimes monœcious or polygamous, either solitary or arranged in spikelets or panicles called *locustæ;* not surrounded by calyx or corolla, but by bracts at the base; *glumes* (outer scales) usually two, alter-

nate and unequal, sometimes solitary; *paleæ* (inner scales) usually two, alternate, the outer one simple, the inner composed of two united at their edges; the *glumes* enclose either one flower, as in Fox-tail-grass, or more flowers, as in Wheat. *Stamens* hypogynous, varying in number, usually three (but in Rice six); anthers versatile; *ovarium* simple, one-celled, with two, rarely one or three, *hypogenous* scales called lodicules; *stigmas* feathery; fruit a *caryopsis; embryo* at the base of a farinaceous albumen. The cuticle of all the Grasses is siliceous.



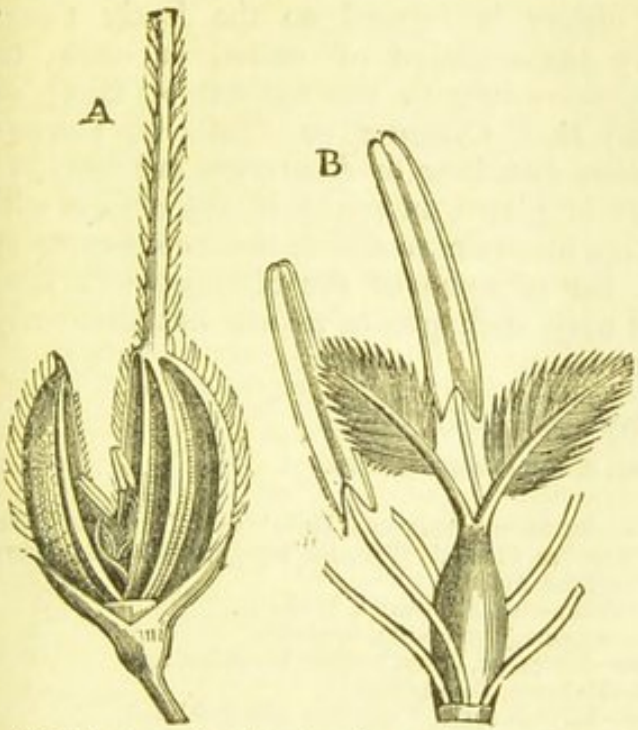
Panicle of the Rice Plant, with its sheathing bract or glume.

Spikelet of the Oat. —*a* Axis.—*g e* Outer glume.—*g i* Inner glume.—*f f* Lower fertile flower.—*f a* Two higher abortive ones.

This is unquestionably the most important order in the vegetable kingdom, as supplying food for man and animals generally. To it belong *Wheat*, *Oats*, *Barley*, *Rye*, *Maize* or *Indian Corn*, *Millet*, *Rice*, and the *Sugar-cane*. Besides the great value of the Grasses, which give us food directly and indirectly of almost every kind, they render many other services. Our lawns are dependent on them for their beauty, and our paddocks and meadows for their utility. Nor should the value of the Bamboos be forgotten. To the native Indian these afford almost all he wants, except the food which he derives from Rice or Maize. With their lightest shoots he makes his arrows, with the fibres his bowstrings and cordage, and from the larger stems his bow and lance. With the hardened stem he builds his house, thatches it with the leaves, and looks no further for material for his chairs, tables, and mats, and when he can write it finds him paper. From the short knotted pieces he makes vessels of all sizes, from a cup to a tub, and from the main trunk, which sometimes rises to the height of a hundred feet, and is often more than a foot in diameter, he fits up his boats and makes water-pipes and fences.

And though the Bamboo is not ranked as an esculent, its tender shoots are said to be as delicious as Asparagus.

Grass is even an architect, for the stability of some embankments depends on its fibres. The *Psamma arenaria* or Sand-reed, which can vegetate amidst dry and drifting sand, thrusting its entangling web to a considerable depth, offers a resistance rarely overcome by the force of torrents. In Scotland, for example, large tracts of a once fertile country have been rendered barren, by the encroachment of sand hills, which have given them the desert-like aspect of Egyptian plains; and this encroachment has resulted from the wanton destruction of the *Mat-grasses*, which were pulled up by the country people for fuel, to such an extent, that an Act of Parliament was passed about a hundred years ago, rendering it punishable to do so.



Rice flower enlarged.—A, palæ and awn; B, ovarium of stigmas, with two of the six stamens.

The commercial value of Grasses to mankind must amount to thousands of millions of pounds sterling annually.

In the preceding analytical sketch we have endeavoured to show the mode in which botanists describe plants, and will now proceed to enumerate some of the principal Natural orders.

NATURAL ORDERS.

THE nomenclature of orders is formed on the Latin name of a well-known type, by the addition of *-aceæ*, or *-ineæ*, to its familiar botanic name, according to the notions or fancy of the different writers. So that *Cistineæ* or *Cistaceæ*, *Caryophyllineæ* or *Caryophyllaceæ*, *Laurineæ* or *Lauraceæ*, are used indifferently. The similarity of plants in many of the groups will generally enable an attentive observer to detect their congeners at first sight. We annex a list of some of the oftenest occurring orders, citing as examples only such plants as are not distinctly implied in the name of the order.

CLASS I. EXOGENS.

Sub-Class 1. THALAMIFLORALS.

ORDER

RANUNCULACEÆ, *Crowfoot* Tribe—Buttercup, Anemone, Hellebore or Christmas Rose, Marsh Marygold, Monkshood, Hepatica, Clematis (Traveller's-joy and Virgin's-bower), Larkspur, Pæony, Columbine, Trollius, Aconite.

MAGNOLIACEÆ, *Magnolia* Tribe—Tulip-tree, Star-Anise, Michelia.

ANONACEÆ, *Custard-apple* Tribe—Asimina, Sweep-sop, Sour-sop.

MENISPERMACEÆ, *Cocculus* Tribe—Moonseed, Colombo-root, Cocculus, &c.

BERBERIDACEÆ, *Berberry* Tribe—Mahonia, Epimedium.

NYMPHÆACEÆ, *Water-Lily* Tribe—Victoria regia, Nymphæa alba and lutea.

FUMARIACEÆ, *Fumitory* Tribe—Dielytra, Corydalis, Platycapnos.

PAPAVERACEÆ, *Poppy* Tribe—Celandine, Sanguinaria or Blood-root, Eschscholtzia.

CRUCIFERÆ, or BRASSICACEÆ, *Cabbage* Tribe—Turnip, Mustard, Watercress, Horse-radish, Stock, Wall-flower, Candytuft, Scurvy-grass, Arabis, Nasturtium, Rocket, Honesty, Shepherd's-purse, &c. This large order is now generally divided into six sub-orders, viz., 1, *Pleurorhizeæ*; 2, *Notorhizeæ*; 3, *Orthoploceæ*; 4, *Spirolobeæ*; 5, *Diplocolobeæ*; 6, *Schizopetaleæ*.

RESEDACEÆ, *Mignonette* Tribe—Reseda luteola (or Weld).

CISTINEÆ, *Rock-rose* Tribe—Cistus, Helianthemum.

VIOLACEÆ, *Violet* Tribe—Heart's-ease or Pansy, Ionidium.

DROSERACEÆ, *Sun-dew* Tribe—Venus's Fly-trap.

POLYGALEÆ, *Milkwort* Tribe—Rhatany, Snake-root, Muraltia, Krameria.

CARYOPHYLLACEÆ, *Pink* Tribe—Carnation, Ragged Robin, Chickweed, Lychnis, Campion, Catchfly, Cerastium, &c. This order is now generally divided into three sub-orders, viz., 1, *Sileneæ* or Pink tribe proper; 2, *Alsineæ* or Chickweed tribe; 3, *Molluginеæ* or Carpet-weed tribe.

MALVACEÆ, *Mallow* Tribe—Cotton-tree, Hollyhock, Lavatera, Hibiscus.

BOMBACEÆ, *Silk-cotton* Tribe—Baobab, Screw-tree, Duhion.

BYTTNERIACEÆ, *Cacao* Tribe—Guazuma, Abroma.

TILIACEÆ, *Linden* Tribe—Lime-tree, Sloanea, Corchorus.

DIPTEROCARPEÆ, *Camphor-tree* Tribe—Vateria, Dryobalanops, Shorea.

CAMELLIACEÆ, *Camellia* Tribe—Tea-tree, Gordonia.

AURANTIACEÆ, *Orange* Tribe—Lemon, Shaddock, Elephant-apple.

HYPERICACEÆ, *St. John's Wort* Tribe—Vismia, Parnassia.

VITACEÆ, *Grape* Family—The Vine, Virginian Creeper.

LINACEÆ, *Flax* Tribe.—Linum, Radiola.

GERANIACEÆ, *Geranium* Tribe—Cranesbill, Heronsbill, Herb-Robert.

TROPÆOLACEÆ, *Indian-cress* Tribe—Nasturtium, Tropæolum Canariensis.

BALSAMINACEÆ, *Balsam* Tribe—Impatiens or Touch-me-not.

OXALIDACEÆ, *Wood-Sorrel* Tribe—Shamrock, Goat's-foot, Ledocarpum.

RUTACEÆ *Rue* Tribe—Fraxinella, Diosma, Galipae.

Sub-Class 2. CALYCIFLORALS.

ORDER

CELASTRACEÆ, *Holly* Tribe—Ceylon Tea, Euonymus or Spindle-tree.
RHAMNACEÆ, *Buckthorn* Tribe—Jujube, Lotus, Colletia, Ceanothus, Alaternus.
TEREBINTACEÆ, *Turpentine* Tribe—Cashew-nut, Mango, Gum Mastic.
LEGUMINOSÆ, *Pulse* Tribe—Bean, Broom, Furze, Clover, Lucerne, Senna, Tamarind, Mimosa, Lupine, Genista, Wistaria, Laburnum, Piptanthus Nepalensis, Acacia, Vetch, Gleditschia, Judas-tree, &c. This important family is divided into numerous tribes.
ROSACEÆ, *Rose* Tribe—Apple, Strawberry, Raspberry, Almond, Pear, Pyrus, Medlar, Spiræa, Apricot, Potentilla, Cotoneaster, Peach, Kerria Japonica, Cherry, Plum, Hawthorn, Mountain-ash. This class being very extensive and differential, is now generally subdivided into four or five sub-orders, viz., 1, *Roseæ*; 2, *Amygdaleæ*; 3, *Pomeæ*; 4, *Chrysobolaneæ*; 5, *Sanguisorbeæ*.
RHIZOPHOREÆ, *Mangrove* Tribe—Carallia lucida, Olesbea.
ONAGRACEÆ, *Evening-primrose* Tribe—Œnothera, Willow-herb, Fuchsia, Godetia, Clarkia.
MYRTACEÆ, *Myrtle* Tribe—Clove, Pomegranate, Guava. Brazil-nuts.
CUCURBITACEÆ, *Gourd* Tribe—Melon, Cucumber, Bryony, Pumpkin, Gourd, Calabash, Vegetable Marrow, Squash, &c.
PASSIFLORACEÆ, *Passion-flower* Tribe—Grenadilla, Tacsonia.
CRASSULACEÆ, *Houseleek* Tribe—Kalosanthes, Sedum, Stonecrop, Houseleek.
CACTACEÆ, *Prickly-pear* Tribe—Indian Fig, Night-flowering Cereus, Opuntia or Pear.
GROSSULACEÆ, *Gooseberry* Tribe—Currant, Ribes Sanguineum.
SAXIFRAGEÆ, *Saxifrage* Tribe—London Pride, Hydrangea.
UMBELLIFERÆ, *Umbelliferous Plants*—Carrot, Parsnip, Celery (poisonous when uncultivated and unblanched), Fennel, Hemlock, Parsley, Chervil, Coriander, Caraway, &c
LORANTHACEÆ, *Mistletoe* Tribe—Nuytsia or Fire-tree.
CAPRIFOLIACEÆ, *Honeysuckle* Tribe—Elder, Guelder Rose, Laurustinus, Leycesteria formosa, Snow-berry, &c.
RUBIACEÆ, *Madder* Tribe—Coffee, Peruvian Bark, Ipecacuanha, Galium, Madder, Woodruff, Ixora, Cape Jasmine.
COMPOSITÆ, *Composite* Plants—Daisy, Sun-flower, Asters, Ageratum, Thistle, Sow-thistle, Lettuce, Marigold, Chamomile, Dandelion, Artichoke, Golden-rod, Chrysanthemum, Cineraria, Dahlia, &c. This extensive class is generally subdivided into three or four sub-orders: 1, *Tubifloræ*; 2, *Labiatifloræ*; 3, *Ligulifloræ*; 4, *Labiatifloræ*.
CAMPANULACEÆ, *Harebell* Tribe—Campanula, Canterbury Bells, &c.
LOBELIACEÆ, *Lobelia* Tribe—Clintonia, Siphocampylus.

Sub-Class 3. COROLLIFLORALS.

ORDER

ERICACEÆ, *Heath* Tribe—Rhododendron, Kalmia, Azalea, Menziesia, Arbutus, Bilberry, Andromeda, Cranberry. Divided by some naturalists into five sub-orders: 1, *Vaccineæ*; 2, *Ericineæ*; 3, *Pyroleæ*; 4, *Monotropeæ*.
AQUIFOLIACEÆ, *Holly* Tribe—Prinos, Skimmia, Parraguay Tea.
PLANTAGINACEÆ, *Plantain* Tribe—Ribgrass, Litorella.
PRIMULACEÆ, *Primrose* Tribe—Primrose, Auricula, Cowslip, Cyclamen, Lysimachia, Pimpernel, Anagallis, Veronica, Polyanthus, &c.
PLUMBAGINEÆ, *Thrift* Tribe—Plumbago, Statice, &c.
OLEACEÆ, *Olive* Tribe—Ash, Lilac, Syringa, Chionanthus, Privet, Phillyrea.
JASMINEÆ, *Jasmine* Tribe—Forsythia viridissima.
GENTIANEÆ, *Gentian* Tribe—Centaury, Polemonium, Frasera.
BIGNONIACEÆ, *Bignonia* Tribe—Catalpa, Tecoma.
GESNERACEÆ, *Gesnera* Tribe—Achimenes, Gloxinia, Strepto-carpus.
POLEMONIACE, *Phlox* Tribe—Gelia, Cantau, Cobœa, Ipomopsis.
CONVOLVULACEÆ, *Bindweed* Tribe—Convolvulus, Ipomæa, Jalap, Scammony, Dodder, &c.
SOLANACEÆ, *Nightshade* Tribe—Henbane, Tobacco, Datura, Stramonium, Brugmansia, Potato, Capsicum, Tomata, Winter Cherry, Petunia, Egg-plant, Nierembergia, Schizanthus.
BORAGINEÆ, *Borage* Tribe—Forget-me-not, Comfrey, Heliotrope, Anchusa, Cynoglossum.
SCROPHULARIACEÆ, *Foxglove* Tribe—Snapdragon, Figwort, Speedwell, Buddlea globosa, Antirrhinum, Linaria, Collinsia, Veronica, Foxglove, Mimulus.
LABIATÆ, *Labiate* Plants—Mint, Sage, Thyme, Rosemary, Basil, Marjoram, Lavender.

Sub-Class 4. MONOCHLAMYDS.

ORDER

VERBENACEÆ, *Vervain* Tribe—Verbena, Teak-tree, Lippia.
ACANTHACEÆ, *Acanthus* Tribe—Bear's Breech, Thunbergia, Justicia, Ruellia.
AMARANTACEÆ, *Amaranth* Tribe—Cockscomb, Globe Amaranth, Prince's Feather, Love-lies-a-bleeding.
CHENOPODIACEÆ, *Goosefoot* Tribe—Spinage, Beet, Strawberry-blite, Salt-wort, Orache.
POLYGONACEÆ, *Sorrel* Tribe—Rhubarb, Dock, Buckwheat.
LAURACEÆ, *Laurel* Tribe—Cinnamon, Sweet Bay, Sassafras, Benzoin.
PHYMELACEÆ, *Daphne* Tribe—Spurge Laurel, Lace-bark Tree, Eagle-wood.
NEPENTHACEÆ, *Pitcher Plants.*
BEGONIACEÆ, *Begonia* Tribe.
EUPHORBIACEÆ, *Spurge* Tribe—Castor-oil, Cassava, Croton, Manchineel, Box.
URTICACEÆ, *Nettle* Tribe—Fig, Bread-fruit, Hemp, Mulberry, Hop, Osage-Orange, Pellitory, Banyan-tree, Upas or Poison-tree of Java. A large order, comprising at least four sub-orders: 1, *Urticeæ;* 2, *Cannabineæ;* 3, *Artocarpeæ;* 4, *Moreæ.*
PIPERACEÆ, *Pepper* Tribe.
INGLANDACEÆ, *Walnut* Tribe—Hickory, Butter-nut.
CUPULIFERÆ, *Mast* Tribe—Hazel, Filbert, Beech, Oak Chestnut, Hornbeam.
AMENTACEÆ, or AMENTIFERÆ, *Catkin* Tribe—Oak, Beech, Hazel, Elm, Poplar, Walnut, Sweet Chestnut, Alder, Hornbeam, Liquidambar, Garrya elliptica. This order is generally subdivided into five sub-orders, viz., 1, *Betulaceæ;* 2, *Salicaceæ;* 3, *Myricaceæ;* 4, *Casuarinaceæ;* 5, *Altingiaceæ.*
CONIFERÆ, *Pine* Tribe—Fir, Larch, Cedar, Yew, Juniper, Cypress.

CLASS II. ENDOGENS.

Sub-Class 1. DICTYOGENS.

ORDER

DIOSCOREACEÆ, *Yam* Tribe—Dioscorea Batatas or Chinese Yam, Tamus communis or Black Bryony, &c.
SMILACEÆ, *Sarsaparilla* Tribe.

Sub-Class 2. PETALOID.

HYDROCHARIDEÆ, *Frog-bit* Tribe—Anacharis, Frog-bit, Water-soldier, Vallisneria.
ALISMACEÆ, *Water-plantain* Tribe—Arrow-head, Alisma, Sagittaria.
ORCHIDACEÆ, *Orchis* Tribe—Bee-orchis, Bog-orchis, Coral-root, Lady's-slipper, Vanilla, Salep, &c.
SCITAMINEÆ, or ZINGIBERACEÆ, *Ginger* Tribe—Turmeric, Cardamom, &c.
MARANTACEÆ, *Arrow-root* Tribe—Maranta, Canna (Indian shot), &c.
MUSACEÆ, *Plantain* Tribe—Banana.
IRIDACEÆ, *Iris* Tribe—Corn-flag, Crocus, Saffron, Tritoma, Ixia, Tigridia, Gladiolus.
AMARYLLIDACEÆ, *Amaryllis* Tribe—Narcissus, Snowdrop, Daffodil, Jonquil
LILIACEÆ, *Lily* Tribe—Hyacinth, Tulip, Squills, Onion, Garlic, Asphodel, Solomon's-seal, Asparagus, Crown Imperial, Yucca, Aloe.
JUNCACEÆ, *Rush* Tribe—Woodrush, Bog-Asphodel.
PALMACEÆ, *Palm* Tribe—Date, Cocoa-nut, Sago Palm.

Sub-Class 3. APETALOID.

LEMNACEÆ, *Duckweed* Tribe.
NAIADACEÆ, *Pondweed* Tribe—Grass-wrack, &c.
PANDANEÆ, *Screwpine* Tribe—Phytelephas or Vegetable Ivory.
TYPHACEÆ *Bullrush* Tribe—Reed-mace, Bur-reed, Cat's-tail.
ARACEÆ, *Arum* Tribe—Wake-robin, Eddoe, &c.

Sub-Class 4. GLUMACEOUS.

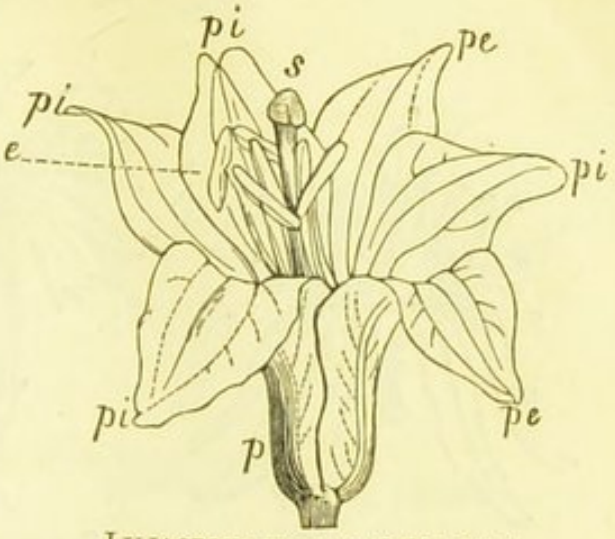
CYPERACEÆ, *Sedge* Tribe—Club-rush, Bull-rush, Papyrus, &c.
GRAMINEÆ, *Grass* Tribe—Wheat, Oats, Barley, Rye, Rice, Sugar-cane, Bamboo, Mat-grass, and the Grasses generally.

CLASS III. CRYPTOGAMIA.

I. FILICES, *Ferns.*
II. LYCOPODIACEÆ, *Club-mosses.*
III. MUSCI, *Mosses.*
IV. EQUISETACEÆ, *Horsetails.*
V. HEPATICÆ, *Liverworts.*
VI. LICHENES, *Lichens.*
VII. ALGÆ, *Sea-weeds.*
VIII. CHARACEÆ, *Stoneworts.*
IX. FUNGI, *Mushrooms, &c.*

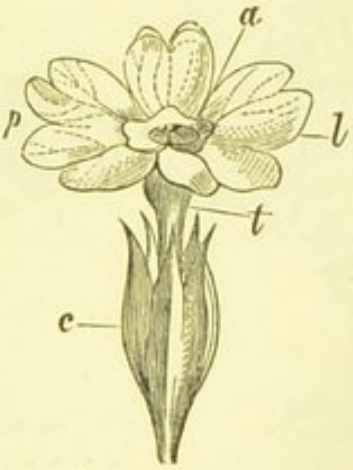
FLOWER FORMS—Corolla and Calyx.

Rosaceous flower (*Sweet Briar*).
b, Bract; *ct*, tube of calyx; *cf*, folioles of calyx; *p*, petals; *e*, stamens.



Liliaceous flower (*White Lily*).
p, Perianth; *pe* and *pi*, out. and in. pts. alternating; *e*, stamens with oscill. anthers; *s*, pistil.

Funnel-shaped, Infundibuliform (*Tobacco*).

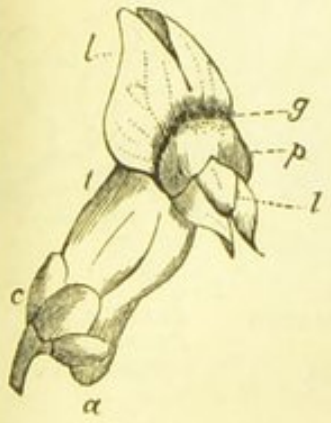


Salver-shaped, Hypocrateriform (*Primrose*).

Thimble-shaped, or Tubular-inflated (*Foxglove*).

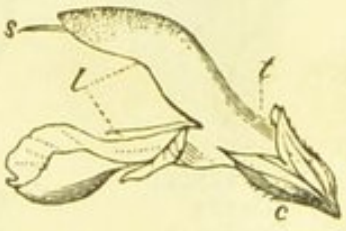
Tubular (*Worm-grass*).

c, Calyx; *p*, corolla; *t*, tube; *l*, limb; *s*, pistil; *a*, anthers; *g*, throat.



Personate (*Antirrhinum*).

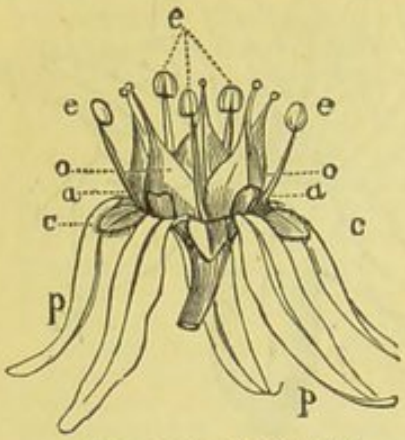
Papillonaceous (*Sweet-pea*).



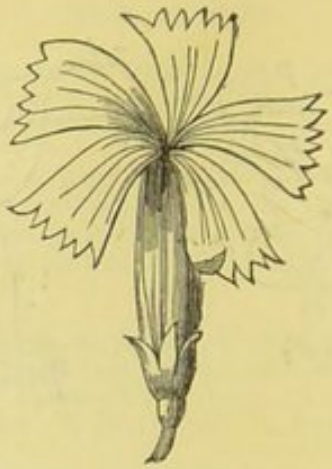
Labiate (*Wild-sage*).

c, Calyx; *p*, corolla; *b*, keel; *e*, standard; *a*, wings; *t*, tube; *l*, limb; *s*, pistil.

FLOWER FORMS.



COROLLA AND CALYX (*Crassula rubens*), each five-leaved.

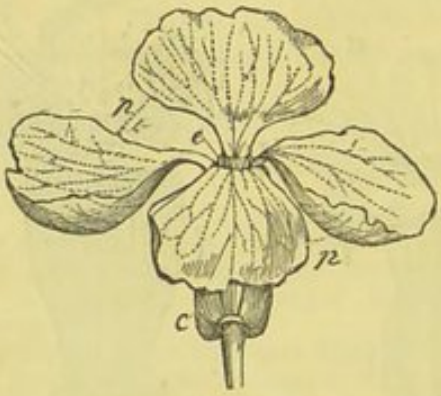


CARYOPHYLLACEOUS (*Pink*).

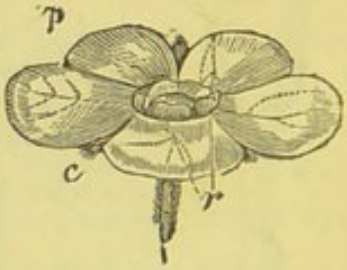
CAMPANULATE (*Canterbury-bell*).

p, Petals; *c*, sepals of calyx; *e*, stamens; *o*, carpels.

URCEOLATE, or Pitcher-shaped (*Heath*).



CRUCIFORM (*Wallflower*).



ROTATE, or Wheel-shaped (*Forget-me-not*).

c, Calyx; *t*, tube; *r*, folds of corolla; *p*, petals; *e*, stamens; *l*, limb; *s*, pistil.

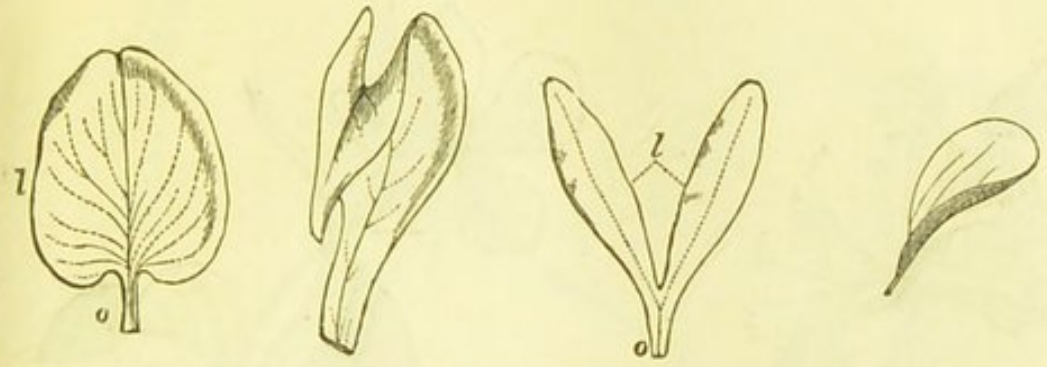
FIVE-PARTED CALYX (*Stellaria*).

FIVE-CLEFT CALYX *Oxlip*).

FIVE-TOOTHED INFLATED CALYX, (*Bladder-campion*).

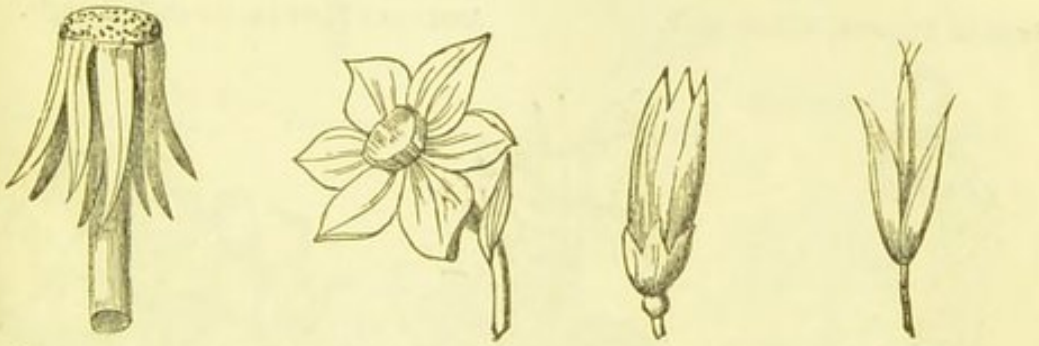
CALYX *c*, and CALYCULUS *b* (*Potentilla*).

FLOWER FORMS.



(*Genista.*)

VARIOUS PETALS OF THE COROLLA
(*Field Eryngo.*) (*Chickweed.*) (*Violet.*)



RECEPTACLE
(*Dandelion*).

NECTARY
(*Narcissus*).

PERIANTH,
Calyx and Corolla
combined.

GLUME
(the chaffy scale of
Grass).

BRACT, a leaf-like appendage
below the Flower.

SHEATH enfolding a flower
(*Snowdrop*).

SPADIX,
enclosed in a spathe
(*Arum*).

FLOWER FORMS.

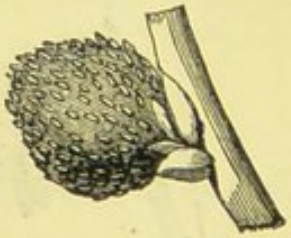
SESSILE FLOWER, without stalk.

AXILLARY FLOWER, the stalk in angle.

Hazel Catkin.

WHORL, or VERTICIL.

INVOLUCRE
(*Chinese Primrose*).



CATKIN, or AMENTUM.
(*Palm Willow*).

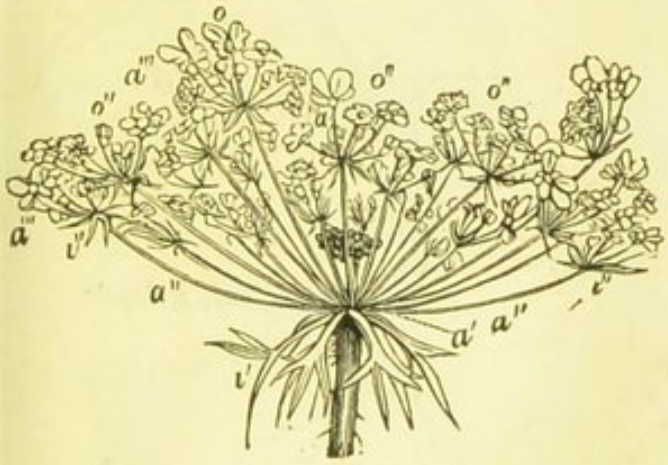
CAPITULUM
(*Thrift*).

CAPITULUM or HEAD.
(*Scabious*).

FLOWER FORMS.

SPIKES.
Flowers close on stem. Vervain.

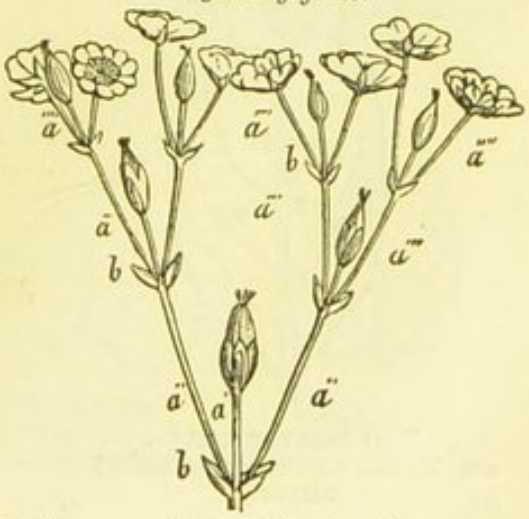
RACEMES.
Upright. Drooping.



COMPOUND UMBEL (*Carrot*).
a' *a''* and *a'''*: primary, secondary, and tertiary radii; *o''* umbellate; *i*, whorl; *i''* bracts.

PANICLE
Quaking-grass.

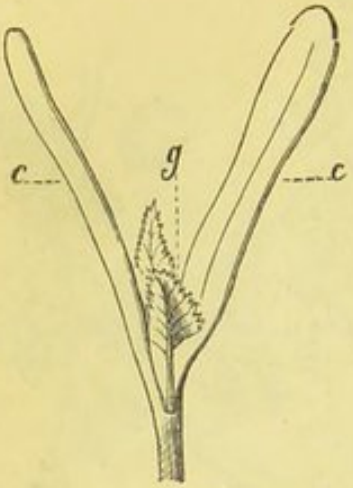
CORYMB.



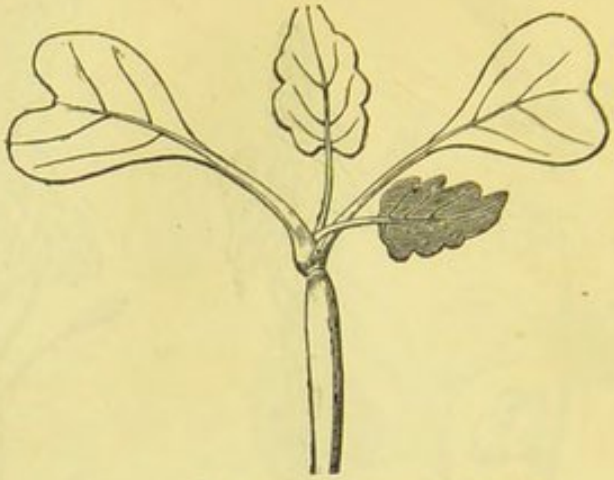
a, radii; *b*, alternate bracts.

CYME (*Cerastium*).

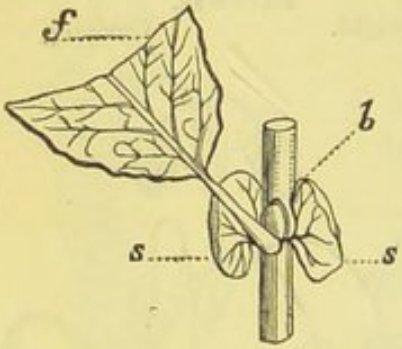
LEAF FORMS.



or seed leaves;
g, plumule.

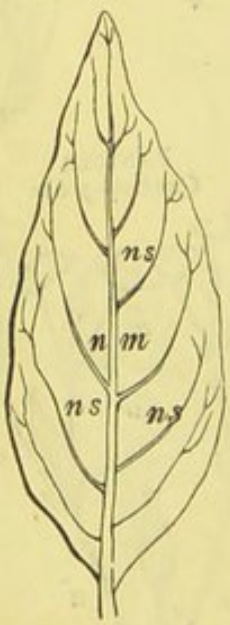


RADISH, showing seed-leaves.

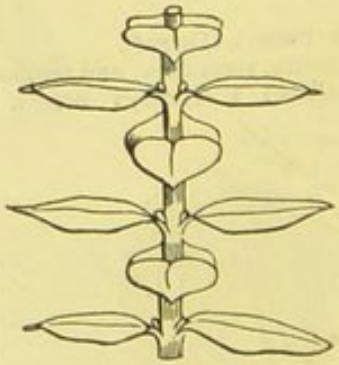


s, Caulinary stipules; *b*, bud;
f, leaf, cut.

f, Cordate leaf; *s*, stipule.



PINNINERVED LEAF.
n m, Median nerve; *n s*, secondary nerves.



DECUSSATE LEAVES,
pairs alternately crossing.

LEAF FORMS.

ORBICULAR, or Circular.

OVATE, Egg-shaped.

OBOVATE, Egg-shaped, but broader at top.

FIDDLE-SHAPED, or Panduriform.

ELLIPTIC, oval, acute at each end.

SPATULATE, oblong, lower end attenuated.

TRIANGULAR, three distinct angles (*Ivy*).

DELTOID, Trowel-shaped.

CUNEIFORM, Wedge-shaped.

LINEAR.

LANCEOLATE.

ARROW-SHAPED, or Sagittate; a triangle hollowed out.

ACEROSE, or Needle-shaped.

RHOMBOID, oval, angular in the middle.

RENIFORM, or Kidney-shaped, as in *Ground Ivy*.

CORDATE, or Heart-shaped, as in *Black Bryony*.

LEAF FORMS.

LYRATE,
Pinnatifid, upper lobe largest.

LION-TOOTHED,
or Runcinate, as in the *Dandelion*.

LOBED,
Lobes rounded—three, five, or seven.

HALBERD-SHAPED,
or hastate.

PINNATIFID,
divided in lateral segments.

BIPINNATIFID,
primary and secondary leaves divided.

PECTINATE,
in slender divisions, like a comb.

TOOTHED,
or Dentate, having small divisions.

DIGITATE,
the leaflets distinct, from a common centre.

PALMATE,
five-lobed, with a palm like the hand.

PLAITED,
folded like a fan, as the *Mallow*.

ACUMINATE,
an acute, awl-shaped point.

MUCRONATE,
with a sharp spine, as in *Thistles*.

CRENATE,
having round teeth.

SERRATED,
with sharp teeth, like a saw.

LEAF FORMS.

TERNATE,
a whorl of three round an axis.

BINATE,
in pairs.

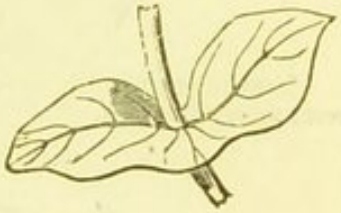
UNEQUAL,
or halved.

PELTATE,
footstalk in middle of leaf.

PERFOLIATE,
the stalk through the leaf.

AMPLEXICAULIS
or clasping, as in *Calceolaria*.

DECURRENT,
running down the stem.



CONNATE,
opposite leaves united at base.

SPREADING,
a gradually outward direction.

OPPOSITE.

UNILATERAL or SECUND,
all hanging one way.

WHORL,
a ring of leaves same plane.

NERVED,
or ribbed.

UPRIGHT,
all with points upwards.

ARTICULATED
or jointed stem.

LEAF FORMS.

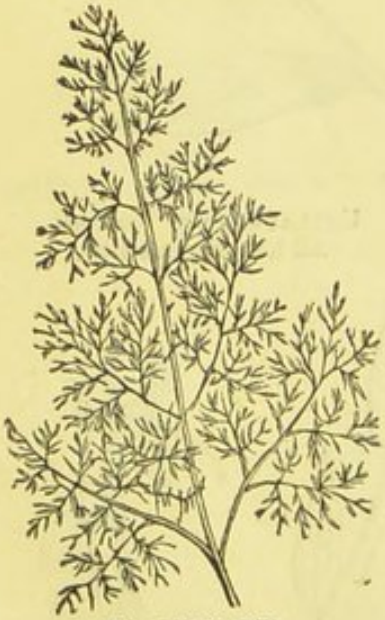
IMBRICATED,
overlapping like tiles.

PITCHER-SHAPED.

FLY-TRAP.

PINNATE,
simple leaf each side
the petiole.

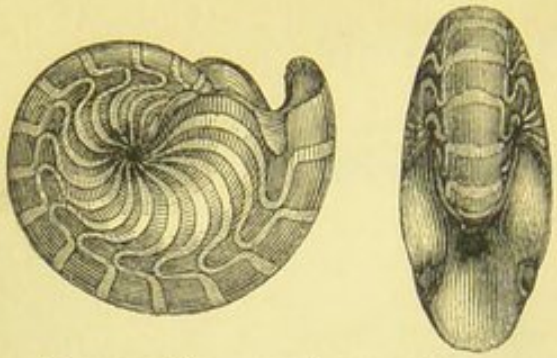
BI-PINNATE AND TRI-PINNATE LEAVES.



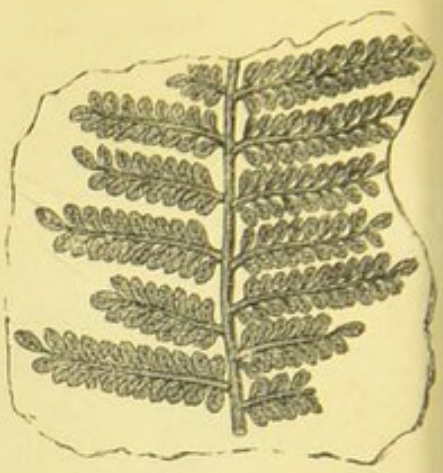
DECOMPOUND.

PALMATIFID.

TRITICHOUS
arrangem nt of leaves.

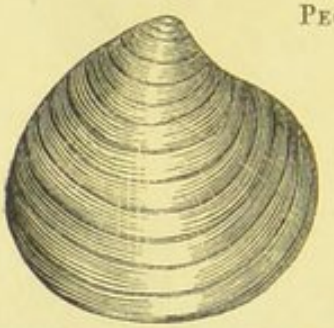


NAUTILUS ZICZAC IN LONDON CLAY.



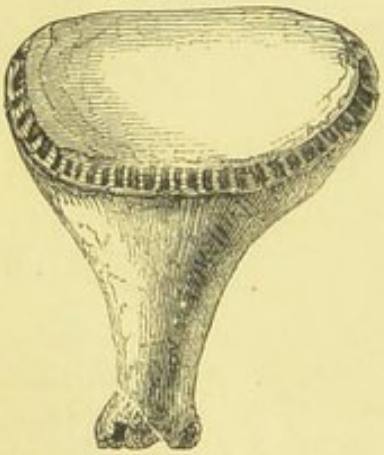
PECOPTERIS ADANTOIDES IN COAL.

NATICA GLAUCINOIDES IN CRAG.



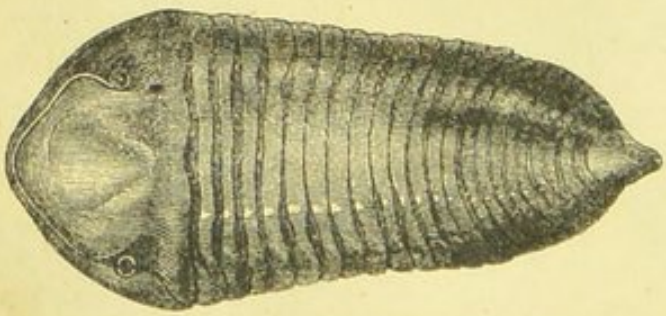
ASTARTE PLANA IN CRAG.

TOOTH OF MACACUS. Eocene.



VENTRICULITE. Chalk-flint.

ANNULARIA IN COAL.



HOMALONOTUS DELPHINOCEPHALUS. Silurian

TOOTH OF IGUANODON. Wealden.

GEOLOGY.

By T. RUPERT JONES, F.G.S.

Chalk-Dust, highly magnified.
a, *a*, Rosalinæ; *b*, Textulariæ.

GEOLOGY (derived from the Greek words *Ge*, the earth, and *logos*, a discourse) is the science which describes the solid materials of the earth, the order in which they are arranged, the causes which have effected or interrupted that arrangement, and the organic remains which are found in the different strata. Geology has been thought by some discrepant with the Mosaic account of the creation, but like Astronomy it will be found to harmonise with it, when candidly examined, and rationally explained. So far from being at variance with Divine revelation, it continually affords new proofs in support of it, as is shown in that excellent work, Pye Smith's 'Geology and Scripture reconciled.'

A geologist may take the special study of the constituent materials of the strata, and then he is a *mineralogist;* he may collect and study the fossils, comparing and elucidating the relations of extinct living forms, and then he is a *palæontologist;* if he direct his attention to Volcanos, or to the structure of mountain-chains, or the arrangement of the strata, and other allied points, he is a *physical geologist;* if he occupies himself in mapping the exposed portions of strata as seen in any country, or traces out the metallic stores of certain rocks, he is recognised as a *practical geologist.*

Few men, or none, can thoroughly master all these branches of geological research, but everybody should be acquainted with the outlines of the science; and the following few remarks are intended to show how interesting the subject is even to the cursory observer of nature. For more complete information, the inquiring student may advantageously refer to Richardson's 'Introduction to Geology and Palæontology,' or Dr. Mantell's 'Wonders of Geology.'

If we pick up a stone, we all know that it belongs to the earth; but many do not know that a flint-stone, a pebble, a rock-crystal, or a diamond, as plainly tell of their original place in the earth's structure, and of certain stages in the earth's history, as the leaf indicates the tree to which it belongs.

We cannot pass many miles out of London by railway, before we reach long cuttings and tunnels in the chalk-hills, either of Cambridgeshire, Herts, Bucks, Berks, Hants, Surrey, or Kent; and in the high white sides of those cuttings we may plainly see bands of flint, sometimes irregular, sometimes stretching along for miles. And if we visit the chalk-pits of the North and South Downs, or of the counties from Norfolk to Dorsetshire, or the Isle of Wight, we shall find in the chalk innumerable beds and lumps of flint lying in their natural position. Here, then, we have the source of the flint-stones which are scattered about the country, especially in gravel-pits. When we pass beyond the cuttings and tunnels in the Chalk, we find different kinds of stone, clay, and sand, forming the valleys and hills, which succeed the high bare chalk-hills, with their smooth downs or widespread fallows. The points where the chalk and stony masses are seen in close contact (as for instance, at Maidstone, Merstham, Guildford, Warminster, Swindon, Tring, Cambridge, and especially at Swanage and the Isle of Wight), show us clearly that the one is not set on the other, end to end, like the edges of two boards in a floor, but that one *passes under* the other, shelvingly, like the planks of a clinker-built boat. Thus the chalk is traceable as a thick outspread mass extending over the south-eastern parts of England, everywhere based upon certain sandy rocks, clays, and sands (known as Upper Greensand, Gault, and Lower Greensand), which are not only seen passing under it at its exposed edges, but are met with in wells that are deep enough to perforate the chalk. These again are found by similar observation to be based upon other stone-beds, clays, and sands, known as the Oolites and Lias, traceable from Yorkshire to Dorset, along the irregular and highly diversified tract of country formed by their exposed edges. But there are again lower masses of rock, clay, marl, sand, &c., *coming out*, as it were, in succession, but somewhat more confusedly, as may be

seen in Wales and the western part of England. After the Lias we shall find the widespread New Red Marls and Sandstone, with their rock-salt and alabaster, and then the Permian Red Marls, with the magnesian limestone. These cover in part the great coal-beds; while in other places, the Coal-measures, the Millstone-grit, and Mountain-limestone (so rich in lead-ore) come out, one after the other, and constitute a large portion of the northern counties and of South Wales. From beneath the last of them (the limestone), the Old Red Sandstone emerges to form the varied scenery of Hertfordshire, and this great mass of sandy beds has its edges upraised at Woolhope, Aymestry, Wenlock, and elsewhere, exposing the still lower Silurian Rocks, which, in their turn, rest against the "bottom rocks" of the Longmynd.

Thus we have a great succession of thick layers of rocky materials; which so overlap each other, that, for aught we know, the Silurian rocks, which have been uplifted in the mountain-heights of Wales, may be continuous with horizontal beds lying deep beneath the midland and eastern counties. The Coal-measures of the north and the west may perhaps be some day traced, by shaft after shaft reaching their low-lying portions, across Oxfordshire into the south-east of England. The Oolites reappear from beneath sand and clays below the Chalk of France, on the south-east, just as they disappear under the Greensands and Gault of Cambridge, Bucks, and Wilts.

This great and orderly succession of rocks is also recognised by the peculiar fossils in the different parts of the stony series. We find Trilobites in the Silurian, buckler-headed and mail-plated fishes in the Old Red, Encrinites in the Mountain Limestone, ferns and fossil trees in the Coal, sea-reptiles in the Lias, land-reptiles in the Oolite, flying reptiles in the Chalk, and innumerable remains of shell-fish, of peculiar forms, in each group of rocks. Not only are we informed by these relics of extinct animals, once inhabitants either of land or sea, that the successive stony masses were formed by the continual deposit of sediment in seas, rivers, and lakes, just as mud, sand, and shell-beds are still being formed; but the splitting of the rocks into layers or beds also clearly indicates that their origin, as slowly formed sediments in water, could alone account for this bedding or stratification.

Since, then, the strata must have been formed in water, along old coasts and in old seas—the borders of which have long ago disappeared, owing to the many alterations in the distribution of land and water which have taken place by means of earthquakes and other disturbances in the primeval world—it follows that the overlying masses must necessarily be more recent than those beneath. And if it is admitted, as it must be, that any one of

these great series of strata, such as the Silurian or the Oolitic, required thousands of years for its accumulation in gradually changing sea-basins, we can scarcely form any conception of the relative age of even the most recent of these stratified groups, namely, the Chalk. Not only the length of time required for the formation of such masses of sediment is to be considered, but also the time necessary for the growth and gradual extinction of group after group, family after family, species after species, of organic beings, both animal and vegetable, all brought to life in their season, all fulfilling their ordained part in God's great creation. Again, the time necessary for the hardening of these sediments, and their imbedded organic remains, into rock, as well as for the heaving and breaking up by volcanic agency, and the lifting up into solid land, or mountain-peaks—must be allowed for; conditions which have constantly occurred between the times when seas left their old beds, and returned to lay down a new sediment.

At some distant period after the Chalk had been formed as the white calcareous mud of a deep ocean, and after that old ocean-bed was raised to a higher level, so that some of it became land, and much of it remained in shallow water, the sea fed on the new cliffs which were presented to its waves; and different deposits of clay, sand, and shell-rock were formed, to which the inflowing rivers added much sediment, often full of leaves of trees and bones of land animals. The flint of the Chalk withstood the action of wave and current much more effectually than did the Chalk itself, and the flint-pebbles accumulated as great shingle-banks, whilst wide sand-beds were formed of the small fragments worn from them. These pebbles still remain in their original position at Blackheath, and elsewhere; for the whole of these clays, sands, and shingles were in time upraised in their turn on the back of the Chalk, and now form the Tertiary beds of the Basins of London, Hampshire, Paris, Vienna, and elsewhere, as well as the wide flat plains of northern Germany, the northern Crimea, &c. The Blackheath pebbles are seen to retain all the character of the chalk-flints, if carefully examined, and tell a plain history of the ancient wear and tear of old chalk-cliffs where now no such cliffs are to be seen.

But in the post-tertiary times, when these recent beds formed part of the dry land, the sea-creeks and rivers, with the tempests and floating ice of many winters, have torn up much of these beds and even of the underlying Chalk, and again have driven the pebbles to and fro, mixing them with the rough chalk-flints from the broken Chalk, and leaving them at last in the gravel-beds, such as are seen at Kensington, Clapham, Bagshot, Hampshire, Berks, &c. Amongst these gravels we sometimes meet with fragments of rock,

more or less water-worn, which have come from a far greater distance than any part of the Chalk area — pebbles from the New Red Sandstone of the midland counties; and these originally derived from Silurian rocks at the period when the New Red Sandstone and conglomerates (or pebble-beds) were formed. What a history have we here! Unseen by human eye, those pebbles have been ground down by passing under the influence of flowing water along perhaps miles of coast, and then left as shingle, to be again and again torn up, after long burials, to enter into the constitution of newer deposits. Their mineral structure and their contained fossils aid us in determining these curious facts. And not only pebbles, but every grain of sand and every minute flake of clay has undergone similar shifting, again and again. The material of what is now London clay was probably once a part of the Lias clay, many of the grains of the Thanet Sand may have been successively the constituents of Cretaceous, Oolitic, New Red, Old Red, Silurian, and even older Sandstones and Quartz-veins. So with limestone, but in a more complicated manner; for the atoms of a limestone, whether soft like chalk or hard like Derbyshire marble, have been the constituent atoms of shells, corals, and zoophytes. Dissolved in the water of an ocean, after being derived perhaps from some old granite, the carbonate of lime was taken by a mollusc as material for its shell; in time the shell lay dead among its fellows and hardened into a lime-rock, which, in the course of ages, raised up as land, was worn by waves or rivers, and again gave up the carbonate of lime to the water, for aliment to living things, each in its turn ordained to supply the materials for its own rocky sepulchre.

Teeth of Hybodus or Shark. Lower Greensand of the Isle of Wight.

Tabular List of the Fossiliferous Strata of Britain.

MODERN DEPOSITS of Rivers, Lakes, Estuaries, and Seas.

TERTIARY, OR CAINOZOIC.

Pliocene, *Newer.*	Brick-earth: Gravels: Northern Drift. 500 ft.	
„ *Older* .	Bridlington Crag: Norwich Crag: Upper or Red Crag: Lower or Suffolk Crag. 500 ft.	
[Miocene, wanting in Britain. 500 ft.]		
Eocene, *Upper* .	Hempstead Shales: Bembridge Marls and Limestone.	1500 ft.
„ *Middle* .	Osborne Shales, Sands, and Limestone. Headon Shales, Sands, and Limestone. Bagshot Sands: Barton Clay: Bracklesham Sands.	
„ *Lower* .	London Clay: Bognor Limestone. Woolwich Clays and Pebble-bed. Thanet Sands.	

SECONDARY, OR MESOZOIC.

Cretaceous (1500 ft.) .	[Danian Beds: Chalk of Maestricht and Faxoe. Wanting in Britain.] White Chalk with Flints. White Chalk without Flints: Grey Chalk: Chalk-marl. Upper Greensand. Gault: Red Chalk: Speeton Clay. Lower Greensand: Atherfield Clay.
Wealden and Purbeck . . (900 ft.)	Weald Clay: Horsted Sands. Cuckfield Grit and Shales: Hastings Sands. Ashburnham Clay and Limestone. Purbeck Shales and Limestones.
Oolite, *Upper* . (500 ft.)	Portland Rock: Portland Sand. Kimmeridge Clay.
„ *Middle* . (500 ft.)	Upper Calcareous Grit: Coral Rag: Lower Calcareous Grit. Oxford Clay. Kelloway Rock.
„ *Lower*. . (600 ft.)	Cornbrash. Forest Marble: Great or Bath Oolite: Stonesfield Slate: Fuller's Earth Oolite. Inferior Oolite Limestone and Sands.
Lias, (400 ft.) .	Upper Lias Shales and Limestone. Middle Lias, or Marlstone. Lower Lias Shales and Limestone.
Trias, or New Red Sandstone. (800 ft.	Keuper Sandstone and Marls. [Muschelkalk of Germany and France. Wanting in Britain.] Bunter Sandstone and Conglomerate.

PRIMARY, OR PALÆOZOIC.

Permian . . . (600 ft.)	Red and White Sands and Marls. Magnesian Limestone. Marl-slate. Red and Yellow Sandstones and Marls.	
Carboniferous .	Coal-measures. 1000 ft. Millstone-grit. 500 ft. Mountain-limestone: Limestone-shales. 1000 ft.	
Devonian . . . (2000 ft.)	Petherwin Shales and Sandstones — Dunnet Head Sandstones. Plymouth Limestones . . . . — Caithness Flagstones. Ashburton Shales and Limestones — Shales, Sandstones, and Conglomerates of Forfar and Hereford.	Old Red Sandstone.
Silurian, *Upper*	Ludlow Bone-bed, Shales, and Limestone. 1500 ft. Wenlock and Woolhope Limestones and Shales. 3500 ft.	Cambrian. (*Sedgwick.*)
„ *Middle*	Llandovery Sandstones and Shales: Mayhill Sandstone. 2000 ft.	
„ *Lower*	Caradoc Sandstone: Bala Sandstone and Limestone. 8600 ft. Llandeilo Flagstones. 5700 ft. Lingula Flagstones: Stiper-stones. 4700 ft.	
Bottom Rocks	Longmynd Schists: Schists of Bray Head: Conglomerates of Sutherland and Ross. 25000 ft.	

MINERALOGY.

Lo! Vanity, with dazzling gems adorn'd,
Flaunts proudly by;—
While Science pores upon a specimen
Rough from the bosom of its native mine.

THE fragrant beauties of the vegetable kingdom having engaged our attention to as great an extent as our limits would permit, let us now examine the dazzling beauties that lie beneath the surface of the earth. We may there find objects to rival, in our admiration, the plumage of the humming-bird and the rich tints of the gayest butterflies and flowers. Among them are to be numbered, Gold, Silver, the precious gems, Marble, Jasper, and an almost endless variety of minerals. This name is given alike to all inanimate productions of the earth; from the most valuable to the most worthless. We have little occasion to descend into the mines, from which specimens are obtained, since they are much more conveniently studied when arranged in a cabinet. Let us, then, proceed to examine them methodically; for, exclusively to select and admire those which, at first sight, please the eye, would be not only uninstructive, but confusing.

Minerals consist of Earths, Alkalies, Metals, and Acids, either simple or variously combined; and some inflammable substances, such as Coal, Amber, and Sulphur. Many of these being manu-

cients attributed the miraculous power of counteracting the intoxicating quality of wine; for which reason, Pliny says, "it is good to wear a ring, or some other ornament, made of this stone, when you wish to drink freely." This advice Pliny, of course, addressed to those of his own sex. The Amethyst has also been believed to be an antidote to poisons, and capable of enabling the wearer of it to foresee, in dreams, future events. It is now deemed to possess a charm very different from that attributed to it by the learned, but too often erroneous, author of antiquity.

2.

Amethyst.

The Avanturine Quartz appears filled with particles of Gold, an effect arising from very minute fissures; and the Cat's-eye, of Ceylon, much esteemed in the East as an amulet of great efficacy, derives its satiny lustre from a fibrous texture. The most elegant of all the species of Quartz is the Precious Opal, which reflects flashes and sparks of the purest and most brilliant colours: on one side a fine rich green seems to grow into Gold, and on the other a sparkling crimson melts into a violet tint. Independently of these, the colour of precious Opal is grayish or yellowish white; the common Opal is of a darker colour, more opaque, and has no brilliant reflections. The finest specimens are brought from Kaschau, in Hungary: they rarely exceed the size of a nut, and are found imbedded in a gray porphyritic rock. There is, however, a celebrated Opal in the Imperial Collection at Vienna, which weighs several ounces, and measures five inches in length; it is unique in size, and unrivalled in beauty. Opal is a very brittle substance, though hard, and consists of Silica combined with a small proportion of water.

Hydrophane is a variety of Opal nearly opaque, and which possesses no brilliancy until it has been immersed for some time in pure water; it then gradually becomes translucid, and some specimens reflect the brilliant colours of precious Opal.

Sand and Sandstone ought not to be omitted in enumerating the varieties of Quartz. The beautifully variegated sands of Alum Bay are well known to visitors to the Isle of Wight; but sand of a pure white is obtained in abundance from the cliffs at Hastings, and is valuable in glass-making. In Brazil and China a very singular variety of Sandstone is found, which, when cut into thin slabs, is distinctly flexible.

In Carnelian and Calcedony, Silica is sometimes united with a small portion of Alumina (Clay). The former is generally red, or milk-white, and occurs only in the form of pebbles, of various sizes, the finest of which come from India, the Tartar frontier of

Persia, Arabia, and the coasts of the Red Sea. Some specimens, which are of a very rich deep red colour, have been artificially brightened by heat; in the rough they are of a deep garnet brown, and in that state are called SARD by jewellers and lapidaries. CALCEDONY, another variety of it, is often bluish or yellowish, with but little lustre, and has, externally, a bubbled or grape-like form, termed botryoidal: it forms the principal part of most Agates, especially of those which fill the cavities of Basaltic rocks in the Faroe Isles, Saxony, and Oberstein in the Palatinate; often in alternate layers of white and brown, or dark gray. Cameos are frequently cut from Agates of this kind, the head being carved in the white Calcedony, and a brown layer forming the back ground. The ancients have left many beautiful works executed in this kind of Calcedony, such as is usually termed *Onyx*, or, if variegated with flesh colour, *Sardonyx*. One of the finest of these, representing the Apotheosis of Augustus, is in the National Museum of Paris; another, which is probably the largest carving of the kind in existence, is the celebrated Mantuan Vase, preserved at Brunswick: it has the form of a cream-jug, and the general colour, which is brown, is relieved by groups of white and yellow figures.

CHRYSOPRASE derives its vivid green colour from the oxide of a scarce metal, called Nickel: it is translucent, that is, it transmits light, but not sufficiently to be called semi-transparent. BLOODSTONE, or Heliotrope, which was formerly supposed to be an antidote against bleeding, by applying it to a wound, is Calcedony, intimately mixed with green Earth, which imparts to it a very dark colour; the red spots, with which it is frequently variegated, are JASPER—an opaque quartzose mineral, containing a little Alumina or Clay, and offering a variety of colours (red, ochre-yellow, brown, and sometimes green), which are caused by the oxyde of Iron. It is abundant in several countries, particularly Sicily and Siberia. Those thin white veins, by which it is intersected, are filled with minute Quartz crystals. Jasper was much prized by the ancients, being considered by them as a precious stone, probably on account of its hardness: it was one of the twelve stones which formed the breast-plate of the high-priest, Aaron. These were arranged in the following order: in the first row, a Sardius, a Topaz, and a Carbuncle; in the second row, an Emerald, a Sapphire, and a Diamond; in the third, a Ligure, an Agate, and an Amethyst; and in the fourth, a Beryl, an Onyx, and a Jasper. The first of these stones is, probably, the dark unburnt Carnelian; the Ligure is not known at the present day; but the name Ligurite has been applied to a hard crystallized mineral, which considerably resembles the Chrysolite.

COMMON FLINT appears, at first sight, to have little affinity with

most of these minerals; yet it is almost pure SILICA, and its hardness equals that of Quartz, which is considerably greater than that of glass; and as this quality does not vary in different specimens, it becomes a kind of standard, with which the hardness of other minerals may be compared, by scratching one with the other. It is not correct, however, to conclude that every mineral which scratches glass belongs to the Quartz family, for there are a great many of intermediate hardness: Felspar, for instance, will readily scratch glass and is easily scratched by Quartz. Others, again, as all the species of Garnets, are much harder than Quartz. That beautiful gem, the Garnet, contains a large portion of Iron, in the state of oxyde or rust, which is the cause of its deep red colour and high specific gravity; namely, about four. The crystals are dodecahedrons (twelve-sided figures, of which the faces are rhombic, or lozenge-shaped, *a*, fig. 3; or else a figure of twenty-four somewhat irregular faces, *b*, fig. 3). There are frequently narrow planes on the first figure, which appear to have replaced its edges all around; the edges are then said to be truncated, a circumstance which frequently occurs to the crystals of this and of other minerals. It is proper, perhaps, to observe, that by a crystal, we do not mean Rock Crystal only, but all regular or symmetrical forms inclosed by plane surfaces, which simple minerals are found to assume. The word crystal (krustallos) signifies ice, and was given by the ancients to the colourless transparent Quartz found in the snowy regions of the Alps, "which," says the credulous, and in this, as well as many other instances, incorrect Pliny, "is indeed ice, but so permanently congealed by the extreme cold, that it can never again become liquid!" In time, the constancy of the form became remarkable, and the term was applied to all other regular solids.

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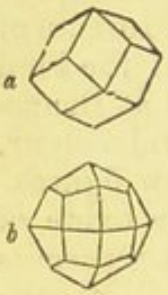

The crystals, both of common and precious Garnet, are usually imbedded in Granite, or some other rock; very small ones are abundantly sprinkled through the micaceous slate of Scotland. The Garnets used in jewellery are distinguished as *Pyrope* and *Syriam* Garnets; the former, of an intense pure crimson, are found in Bohemia, Saxony, and Greenland, and are supposed to be identical with the Carbuncle of the ancients. The latter variety, in which the tint is often blended with a shade of violet, are named from Syriam, a seaport of Pegu, whence they are obtained; they are often miscalled *Syrian* Garnets. Owing to their depth of colour, these gems are rarely cut with facets like other precious stones, but *en cabochon*, with a very convex form, and often hollowed out underneath, by which a greater degree of brilliancy is

obtained. Common Garnet, a more abundant variety, is of a dull brown or green colour, nearly or quite opaque, and contains Lime. The *Melanite* and the *Leucite* are varieties of the Garnet; the former, which is found at Frescati, near Mount Vesuvius, is constantly black; and the latter, of a grayish white colour, is abundant in some of the Vesuvian lava.

The Tourmaline (fig. 4) possesses two very singular characteristics: one is the power of becoming strongly electric, with polarity, on being heated; indeed, more obviously so than any other mineral. If you suspect a crystal to be a Tourmaline, and wish to try its electricity, hold it in a slender pair of pincers, set in a glass handle, over the flame of a wax candle or small lamp, but not so near that it may be blackened by the smoke. When it is just too hot to touch, on holding it near a very small piece of gold paper, suspended by a silken thread, if it be a Tourmaline, it will attract it; and the same end will presently after repel it. The other remarkable circumstance is, that although the crystals, which are prismatic, and always streaked lengthways, appear perfectly transparent on looking through them from side to side, yet, if you look at the ends of a crystal, let it be ever so short, it will be found to be opaque. *Iolite*, another species of the same family, possesses a somewhat similar property; in one direction it appears purplish blue, in another it is yellowish brown. From this circumstance it was named *Dichroïte*, signifying of *two colours*, but the same peculiarity has since been observed in other mineral substances. It occurs in Spain, Bavaria, and Finland. Tourmalines are found in North America, Brazil, and the Island of Ceylon, of a green and dull blue colour; yellow ones are sometimes brought from the last-mentioned place, scarcely inferior to the Topaz; and Castile affords fine slender crystals of a dark brown. Red Tourmalines, also, have been brought from Ceylon, Siberia, and Ava; they contain soda and boracic acid, and are called Rubellites, from their resemblance to the Ruby.

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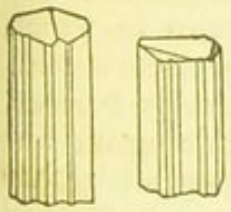

Tourmaline.

Those whitish and reddish grains, nearly opaque, in Granite, the common paving stone of London, are *Felspar;* the grayish ones, more transparent, are *Quartz*, and the dark shining particles are called *Mica.* In larger masses of Felspar, which is an abundant ingredient of many rocks, the laminated or crystalline structure is more distinct; you may perceive, that wherever it is broken the surface of the fracture is shining and almost perfectly flat; it is therefore said that it may be cleaved, or it possesses a cleavage, which is parallel to two opposite faces of the primary crystal. This crystal is an oblique prism, and it may be cleaved or

split in two other directions, parallel to the remaining faces, but not with the same ease (see fig. 5). The capability of being cleaved is one of great importance, because it enables us to determine the primary crystals of such minerals as possess it, their planes meeting at the same angles as the planes of cleavage. By the assistance of an instrument, called a goniometer, these may be measured very exactly; and thus the species to which the mineral belongs may be ascertained. It is true, that when the crystals are large and tolerably perfect, there is no need of resorting to this mode of determining it; but they are very often imperfect, extremely small, or heaped together in great confusion. In some minerals cleavage can be obtained only in one direction: such is the Topaz; and such is Mica, commonly called Muscovy Talc, and Muscovy glass, from its appearance and locality. One might, indeed, mistake the large transparent plates for glass, if set in a window-frame, though they are not always quite colourless. They are thus used in Transylvania and Siberia, where the largest specimens are obtained, from cavities in the Granite rocks. In the Russian ships of war Mica advantageously supplies the place of glass; being very elastic, it is not liable to be broken by the concussion produced by firing artillery. Perfect crystals of Mica are small and rare; they are six-sided prisms (fig. 6), but small brilliant hexagonal plates of Mica, of a fine green colour, are abundant in some of the Vesuvian lavas. But we have examined only one species of Felspar, the common or massive kind. Moonstone, or Adularia, a very white and pure variety, exhibits a pale blue floating light, and is used in jewellery; indeed, its delicate appearance, so like "the silver moonlight," certainly entitles it to rank among the precious stones, while the Cat's-eye is admitted as one. It is found in Ceylon, and in some of the Swiss Alps. Porphyry consists chiefly, and sometimes entirely, of Felspar; in the antique Porphyries, small white grains and crystals are imbedded in a green or red variety; but this has a close, compact texture, and when broken, shows no trace of cleavage or crystallization. The desert coast of Labrador affords us another beautiful species, now called Labradorite. It can by no means be compared to Opal in brilliancy, yet the dark blue, green, and various shades of orange and flame colour, which it reflects in certain lights, remind one of the changeful plumage of some birds, and render it

5

Felspar.

6

Mica Crystals.

much more pleasing than its dark gray colour would, at first sight, lead us to expect. The Labradorite should be cut into small slabs, and polished, to show it to advantage. In England, Felspar is largely consumed in the manufacture of porcelain, to which it imparts a fine texture and a greater degree of transparency, when mixed in proper quantity with the other ingredients. Felspar and Mica both contain potash or pearlash.

The LAPIS-LAZULI, or Azure-stone, which is brought from Persia and Great Bucharia, may always be known by its beautiful and constant blue colour, exactly similar to the ultramarine blue, which is prepared from it by grinding and washing. It is used for ornamental purposes, although its granular texture prevents it from receiving a high polish.

The next specimen which we shall notice, is one that might be mistaken for a piece of black glass, which it certainly very much resembles in its colour, lustre, and the conchoidal, or shell-like form of its fracture. It is called OBSIDIAN, and occurs abundantly in countries where extinct volcanos exist. In Mexico, there is a mountain of Obsidian, called by the natives "the mountain of knives," (which the Spaniards also translate "la sierra de las navajas,") because they use the thin fragments, which are extremely sharp-edged, instead of knives and razors. It is called also *Volcanic glass*, and is found among the substances ejected by volcanos, both extinct and active. PUMICE has little external resemblance with Obsidian, but in composition they are nearly alike; and if Obsidian be exposed gradually to a strong heat, it will froth and become spongy, like Pumice. This experiment may be made on a small scale, with a blowpipe (fig. 7), which is a tube with a very small aperture, used to direct and concentrate the flame of a lamp or candle, by means of the breath. In making use of it, the fragment should be held in a pair of pincers made of Platina, or placed on a strip of Platina foil. Pitch-stone, another of the same family, is more opaque than Obsidian, most frequently dark green, and less shining. We will now leave these dull-looking minerals, and turn for a few moments to the bright crystallized Zeolites. In all the minerals of this family, Silica combined with Alumina is the principal constituent; but they all contain a portion of alkali—generally Soda—or one of the alkaline earths—namely Lime; and in one species Baryta.

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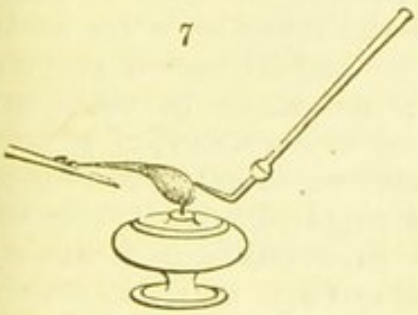

Blowpipe.

PREHNITE, which was first discovered at the Cape of Good Hope,

is translucent and yellowish green; but the greater part of the species are colourless. The substance commonly named Oriental Jade, which the Chinese carve into images and cut for other ornamental purposes, is a compact variety of Prehnite, nearly as hard as quartz, and sometimes almost colourless.

Natrolite (fig. 8), so named from containing Natron or Soda, occurs sometimes in opaque masses, composed of delicate fibres, of an orange or buff colour, arranged in a radiated form; but the crystals, which are slender square prisms, terminated by flat pyramids, are transparent and very brilliant. Mesotype, which closely resembles it, contains lime as well as soda, and both are found in cavities of Basaltic rocks, as at the Giant's Causeway, the Isle of Staffa, and other places; the fibres, which are delicate acicular crystals, are always in radiated tufts. These cavities are often partially filled by Calcedony or Agate, and the interior studded with various zeolitic species; sometimes the pearly crystals of Stilbite (fig. 9) or Analcime, which takes one of the forms of Garnet (fig. 3 *b*), and sometimes by the singular little groups of Harmotome (fig. 9 *b*), of which the surface resembles a beautiful porcelain. With the exception of Prehnite, these minerals, if powdered and mixed with a small portion of muriatic or nitric acid and heated, will, in a short time, acquire the consistence of a jelly. We must not carry our admiration of the crystals so far as to neglect or despise the Clays and Slates on account of their want of beauty; for many of them are eminently useful. The Porcelain Clay, of a pure white, and soft, smooth texture, is extensively used in our potteries, which are supplied with it from the north of Derbyshire, and St. Austle's, in Cornwall. Bricks are made of a coarse Clay, much discolored by Iron, and intermixed with Sand, called Loam, which is abundant in the neighbourhood of London, and many spots in the south-eastern part of England, as well as in other countries. Tripoli is a very silicious variety, so named from the country whence it was first procured. It is easily reduced to a sandy powder, and is employed in polishing Marble, japanned ware, and other articles. Rotten-stone, which is another production of Derbyshire, of a dark gray colour and much softer, is used for the same purposes. One of the most useful species of this family is Fuller's Earth: before the invention

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Natrolite.

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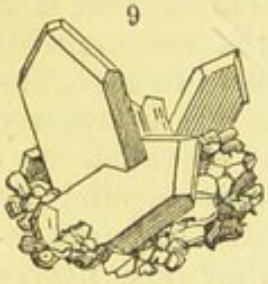

Stilbite crystals.

9 *b*

Harmotome.

of soap, it was considered so valuable for the cleansing of woollen cloth, that its exportation from England was forbidden, under a severe penalty. Like Loam, it is found chiefly in the south-eastern part of this country. A stiff Clay, from which Yellow ochre is prepared, is dug in Oxfordshire.

Of the SLATES, the kind which is used for roofing houses is the most abundant; indeed, it forms a great part of the high mountains of Wales, the north of England, and Scotland, and occupies large tracts in several other countries. A harder species, of a light gray or greenish colour, is the WHET-STONE or TURKISH HONE, used for sharpening cutlery; and the French and Italian Chalk, of which crayon pencils are made, are slate, containing a portion of charcoal. There is another mineral, called FRENCH-CHALK, very different from this, both in its appearance and composition; we allude to the substance which is so useful in removing spots of grease from silk and stuff; in Mineralogy, it is called SOAP-STONE, or STEATITE, and belongs to the Magnesian genus, and to the same family as Talc. We are not speaking of Mica, incorrectly called Muscovy Talc, but of a much softer mineral, usually found in Magnesian or Calcareous rocks, and which is not elastic, though somewhat flexible. It has a more pearly lustre than Mica, and is very soft and unctuous to the touch. Beautiful specimens of GREEN TALC are brought from St. Gothard, but the laminæ rarely exceed a few inches in size.

Among the minerals containing Magnesia and Lime combined with Silica, HORNBLENDE and AUGITE are perhaps the most abundant, and in one form or other, most widely distributed. There are several varieties of each. Some, which contain a large proportion of Iron and but little Lime, are black or intense olive green, and these in a granular form are intimately mixed with Felspar. Hornblende (called also Amphibole) with one kind of Felspar constitutes *Greenstone*, and when grains of Quartz are also intermixed, it becomes *Syenite*, a rock very much resembling Granite in appearance. BASALT, which is nearly black, is a very compact mixture of Felspar with black Augite; crystals of the latter and of Hornblende are often imbedded in these rock masses. Other varieties, in which there is little or no Iron, are white or pale green.

That very peculiar substance, AMIANTH or ASBESTUS, of which the ancients made the wicks of their everlasting lamps, is another form of Hornblende. The name Asbestus signifies *unconsumed*. Amianthus or Amianth (implying *unstained*) equally incombustible, from the facility with which its soft silky fibres could be spun, by the addition of a little flax or thread, was woven into cloth; and in this the ancients wrapped the bodies of the deceased previous to burning them, to preserve their ashes unmixed with those of

the funeral pile. When, therefore, Asbestus cloth is soiled, it may be restored to its original whiteness by carefully burning instead of washing it. Strange notions concerning Asbestus have formerly prevailed in countries where such cloth was seen and its true nature unknown. Marco Polo, who travelled far into the east in the thirteenth century, says—"There is a substance found in the mountains of Tartary of the nature of the Salamander, and which being woven, is incombustible." This property has of late years caused it to be applied to gas stoves, small tufts being disposed among the tubes that supply the gas.

Asbestus of a more compact texture, though still fibrous and of a silky lustre, often resembles wood, particularly when flakes of silvery Talc are mixed with the fibres; this kind is common in Scotland and the Serpentine rocks of Cornwall, and other countries. Another kind has so spongy a texture, that it has received the name of Mountain Cork. The Portsoy and Anglesea Marbles (improperly so called), and the Verde Antique of Corsica, are varieties of Serpentine.

Potstone differs little from Serpentine, but has a less agreeable appearance, being always dull olive green, veined with gray; it is, however, a most useful substance, and has been for centuries manufactured into pots, basins and various domestic utensils, which being insoluble can never impart any taste to food or liquids; neither is it brittle, but soft enough to be easily wrought. The Potstone quarries on the Lake of Como were worked from the beginning of the Christian era till the middle of 1618, when they fell in; large quantities are still raised in the Valais, Saxony, and other places. It was well known to the ancients, who applied it to the same uses as at present. They named it Lapis Siphnius, from Siphnos (now Siphanto) in the Archipelago, whence they obtained it.

The Chrysolite, a beautiful but soft gem, is arranged near these minerals; its name, very properly, signifies a stone of golden green colour. The Chrysoberyl, of a paler green, and the Sapphire, which, in hardness, is inferior only to the Diamond, belong to the Ruby family, and the Aluminous genus; indeed, they consist almost wholly of the earth, Alumina. Sapphires are of various colours; blue, purple, yellow, rose-colour, white, and, more rarely, greenish: these varieties are usually known by the name of Oriental Amethyst, Oriental Ruby, &c. Their lustre is very great, and their specific gravity about four, which is higher than that of most earthy minerals. The crystals of Sapphire are prisms and pyramids of six sides (fig. 10); but the

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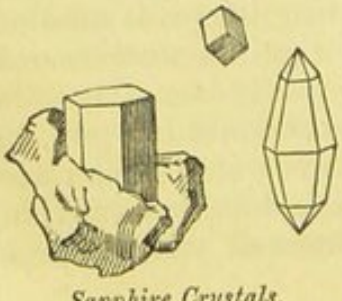

Sapphire Crystals.

cleavages are parallel to the faces of the primary rhomb, which, though rarely found in nature, may, without much difficulty, be obtained by splitting off the alternate angles of the prism, above and below (fig. 10*). The cleavages, however, are much more distinct in *Corundum*, a less pure variety of Sapphire. In some specimens, the ends of the prism, when rounded and polished, exhibit a moveable six-rayed star of light: these are called *Asteria* or Star-stones. EMERY, which is made familiar to us in scouring paper, is a granular variety of Corundum, containing much iron and other impurities: reduced to a fine powder, it is much used in cutting the softer stones, such as Amethyst, Agates, Lapis-lazuli, &c.

10 *

The species called SPINEL, or Balas Ruby, is prized for its very rich crimson tint, which is attributed to a small quantity of the oxide of a metal called Chrome, that enters into its composition. The form of the Spinel crystals is the octahedron (fig. 11), one of the five regular or platonic solids; these are found loose in the sand of Ceylon, with crystals of Sapphire, Chrysoberyl, Topaz, and Zircon, often much worn and rounded. From the latter mineral the earth ZIRCONIA was named, being first discovered as the principal constituent of the little crystals of Zircon (fig. 12); they are so called by the Cingalese; the word signifying, in that language, four-cornered. The Jacinth and Jargoon are varieties of Zircon; the colourless ones are sometimes used as *jewels* in watches, instead of diamonds. This is the heaviest of all earthy minerals, but not quite so hard as Spinel. It is a curious fact, that the metal, Chrome, which tinges the Ruby with crimson, is the cause of the beautiful green in the Emerald. And, surely, the Emerald is, after all, the most lovely of the precious stones! The eye, after roving from the Diamond to the Ruby, the Sapphire, the Amethyst, and the Topaz, fatigued by excess of brilliancy and variety of colours, rests with delight upon its refreshing green—Nature's favorite tint. The finest Emeralds are now found in Peru; but they were formerly brought from Ethiopia, and were so much prized by the ancients, that, in general, they would not engrave on them as on the other precious stones. The primitive, and most usual crystal of the Emerald, and also of the Beryl, or Aqua-marine, is an hexagonal prism (fig. 13). These two minerals, the Chryso-

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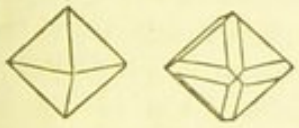

Spinel crystals.

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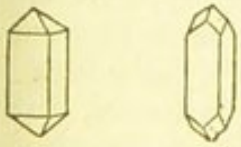

Zircon crystals.

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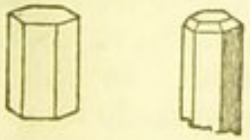

beryl and the Euclase, which is remarkable for its brittleness, contain the earth GLUCINA. The CHRYSOBERYL, which is nearly as hard as the Sapphire, is of a pale yellow green; and some crystals reflect a bluish *chatoyant* light, like that of Moonstone.

14

But, in speaking of the Zircon and Emerald, we have omitted to notice the TOPAZ (fig. 14), which belongs to the Aluminous genus. It is a mineral to be found in many parts of the world; always crystallized, more or less perfectly; sometimes in the beds of rivers, and sometimes in the veins of mountains, with Rock Crystal and Aqua-marines. The bright rose-colour of these crystals is not their natural tint, but is produced by exposing the deep orange-coloured Topazes of Brazil, to a considerable heat for some hours, and then allowing them to cool slowly. The Siberian Topazes are generally colourless or greenish: small pale yellowish crystals have been found in the Cornish Tin mines. It must not be forgotten that the Topaz is considerably harder than Rock Crystal, and is, moreover, distinguishable from it by its perfect cleavage in one direction, affording very brilliant and perfectly flat surfaces, exactly at right angles to the sides of the prisms. We must notice one other mineral before we take leave of this class: it is called GRENATITE, from the resemblance in colour to Garnet; and also, from its form, Cross-stone (fig. 15). The cross is produced by the intersection of two crystals, which are six-sided prisms; sometimes obliquely, and sometimes at right angles. Cross-stones are found on Mont St. Gothard, at Compostella in Spain, and some other places, most usually imbedded in silvery Talc, with crystals of a transparent blue substance, called CYANITE (fig. 16), pronounced, and sometimes written, Kyanite.

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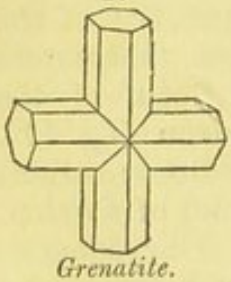

Grenatite.

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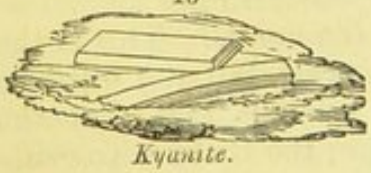


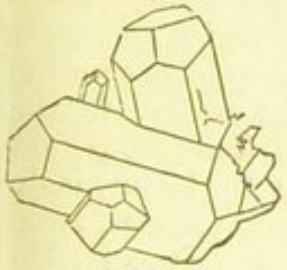
Kyanite.

ACIDIFEROUS EARTHY MINERALS.

LIME, which enters into the composition of so many minerals, has never been found in a simple or uncombined state; but its combinations with the different acids, which are nearly free from any other admixture, are very characteristic; and form, of themselves, a distinct genus, called the Calcareous genus. In Limestone and Marble it is united with *carbonic acid*, commonly known by the name of fixed air; because, though when pure and uncon-

fined, it is gas or air, it enters into the composition of solid substances. When Lime-stone, or Marble, is burnt, this acid expands and evaporates, and the stone becomes pure, or QUICK LIME.

17

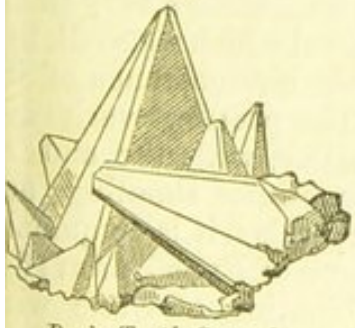


Calcspar.

Like most other minerals, Carbonate of Lime, in its purest state, is crystallized, colourless, and transparent; and is then called CALCSPAR (fig. 17). The Lead mines of Derbyshire and Staffordshire, and the Dufton mines in the north of England, have long been celebrated for the beautiful specimens which they afford of this mineral; and especially for their rare crystallizations, which are often extremely complex, though small. The primary and most simple form of Calcspar, is an obtuse rhomboid, which, however, seldom occurs; but the crystals derived from it are very various, and many of them abundant: they are combinations of the planes of rhomboids, both acute and obtuse, of six-sided prisms, and of dodecahedrons; not such dodecahedrons as those of Garnet, but having twelve triangular faces, forming a kind of double pyramid. Very fine groups of the six-sided prisms are brought from the mines in the Hartz forest, having their terminations white and opaque.

The figure, commonly called DOG'S-TOOTH CRYSTAL (fig. 18) is a pyramidal dodecahedron; the alternate edges being sometimes replaced by narrow planes, which if extended uninterruptedly would form an acute rhomboid: those from Derbyshire are frequently of a topaz colour. This mineral possesses in a high degree, the remarkable property of double refraction: place a transparent fragment on a black line, or any printed or written word, and it will appear as if written or printed twice (fig. 19); and by moving the fragment, the two images will appear to move till they coincide. — A somewhat crystalline structure may be observed in Marble; some kinds of which abound in petrifactions of shells, and other organic bodies.

18



Dog's Tooth Crystals.

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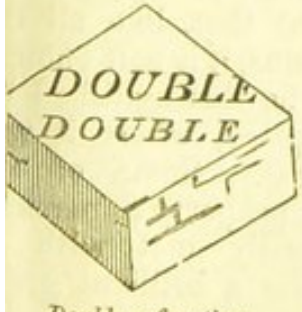

Double refraction.

CHALK is carbonate of LIME in an earthy form; and, if burnt, would afford LIME equally with Lime-stone or Marble. Another property which characterises the minerals of this family, and is peculiar, more or less, to all carbonates, is that of

effervescing when dissolved in any strong acid. In order to observe this, you need only touch the specimen with a small drop of nitric, or muriatic acid, and the effect will be easily perceived.

In this investigation of Calcareous minerals, we cannot omit to bestow a few observations on the celebrated *petrifying springs of Matlock*, and must deprive them of the renown they have acquired by the magical power ascribed to them. The water, flowing through Lime-stone rocks, is impregnated with Calcareous matter, intermixed with Clay, which, on exposure to the air, is deposited from it: hence it forms an incrustation on stones, twigs, moss, shells, or any other object, over which the springs trickle; this is called Calctuff, or Tufa. In Auvergne, there are some streams which possess this incrusting property to an astonishing degree. At Clermont, one of them has formed, by degrees, an embankment above 200 feet long, 16 feet high, and of considerable breadth. This water being conducted by artificial channels to a hut erected for the purpose, is subdivided into small streams, and made to descend in the form of spray, to the floor, on which are placed a number of moulds, such as of medals. In about three months, they are covered with the Calcareous deposit to the depth of perhaps the eighth of an inch; it is of a pale fawn colour, of a perfectly even texture, and the surface of the medals beautifully polished.

A species of carbonate of Lime, containing sometimes a very small portion of the carbonate of Strontia—a mineral which we shall, by-and-by, notice—is called Arragonite, from the circumstance of its having been first observed in Arragon. The prettiest variety is one which has the appearance of white Coralline, with the ends of the branches sometimes shooting out little tufts of crystals: it is commonly known by the name of Flos Ferri (fig. 20).—The combination of Lime with phosphoric acid, is called Phosphate of Lime; and also Apatite. Its crystals resembling, in form, those of the Beryl, might almost be mistaken for that substance, but that, like all the minerals of this genus, it is soft enough to be scratched with a knife. It may also be distinguished by placing it on some hot coals, in a dark place, where it will shine with a beautiful phosphorescent light. Some of the Fluors or Fluates of Lime, possess this property; particularly a variety called Chlorophane, usually met with in Siberia, which, when gradually heated, emits a brilliant green

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Flos Ferri.

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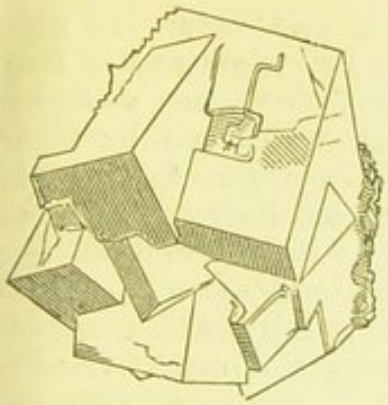

Fluor Crystals.

light. APATITE is considerably harder than Calcspar; and FLUOR, which is Lime combined with fluoric acid, is intermediate between them. Its crystallizations (fig. 21), are most frequently, the cube, and other solids which appear to be derived from it; but its primary form is the octahedron, which may be easily obtained from it by cleavage. The transparent, purple, and green Fluor of Yorkshire and Cumberland, is abundant in the Lead mines, and is beautifully contrasted with colourless crystals of Quartz and Calcspar, and sometimes accompanied by Lead ore and Pyrites, which is an ore of iron of a brass yellow colour; you have often seen it intermixed with Coal, and have been told, perhaps, that it is Gold.—

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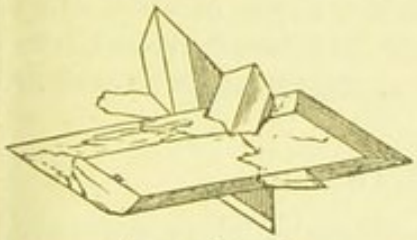

Gypsum Crystals.

The fibrous, or radiated Fluor of Derbyshire, generally called Spar, acquires its rich purple tints by exposure to heat. SULPHATE OF LIME, or GYPSUM (fig. 22), which is the combination of LIME with sulphuric acid, is very soft; its crystals are often pearly and transparent; but it is more frequently granular, shining, and sometimes of a reddish colour. When burnt, it becomes plaster of Paris. The substance called ITALIAN ALABASTER, so much employed for carving statuettes, vases, &c., is a white granular Gypsum, admirably adapted for such objects by its softness and purity. It is obtained in the neighbourhood of Florence; and also in Nottinghamshire, together with a fibrous variety resembling Satin Spar; but the true Satin Spar is a *Carbonate* of Lime.

The delicate white and minute crystals seen on some dark brown Slates, are natural ALUM; but the quantity of sulphate of Iron which they contain, gives them an inky taste, very unlike that of manufactured Alum. Phosphoric acid, combined with Alumina and a large proportion of water, furnishes us with a very pretty mineral, named WAVELLITE (fig. 23), from Dr. Wavell, who discovered it in Devonshire: it forms small globular masses, having a somewhat crinkled surface, which are usually attached to a kind of Slate. When these little globes are broken, they exhibit a

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Wavellite.

very perfect radiated structure. CRYOLITE, a combination of Alumina with Fluorine (or Fluoric Acid) and Soda, is a white semitransparent mineral, splitting readily into right-angled fragments. It is so extremely fusible that small pieces may be melted in the flame of a candle: a quality which occasioned its name, signifying *Ice-stone*, from the Greek *Kruos* (or *Kryos*), Ice. Cryolite is found chiefly in Greenland, and has for some time past been much sought after, because the metal Aluminium is obtained from it with more facility than from other aluminous minerals.

HEAVY SPAR, so named from its specific gravity, which is above four, is the sulphate of the earth, BARYTA (fig. 24). The crystals are generally very well formed, and either colourless, dark brown or yellow. Of the earth, STRONTIA, we have the Carbonate, which is greenish and somewhat radiated; and the Sulphate in bright colourless or bluish crystals, which, both in form and weight, strongly resemble those of sulphate of Baryta. It was named STRONTIA, from Strontian, a village in the county of Argyle; but the finest specimens are brought from Sicily.

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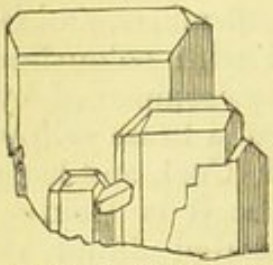

Sulphate of Baryta.

ALKALINE SALTS.

The Alkaline Salts form a very inconsiderable class, compared with the two we have just examined. A few of the species are, however, abundant; NITRE, or SALTPETRE, which is a nitrate of Potash (or Pearlash), is collected in large quantities from the surface of the ground, in Spain, Egypt, and some parts of India, during the hot season that follows the rains. But the name of NITRUM was given, by the ancients, to the Carbonate of SODA, which abounds in some small lakes near the town of Nitria in Egypt. In the summer, these lakes become dry, or nearly so, and the ground is then thickly covered with this Salt. It was also called NATRON, a name which it still retains. The lakes of Hungary also contain Natron in solution, and in dry weather it is collected from their shores, which it covers with a white powder, or tufts of minute crystals. ROCK SALT (the Chloride of Sodium),* is very plentiful in England, and some other countries. Almost every one has read an account of the extensive Salt mines of Poland, which are about six hundred feet deep, and a description of the chapels, altars, &c., which are carved in the Salt rock; but their brilliancy has, probably, been very much exaggerated. The Salt mines of Cheshire, also, are very extensive, and have supplied us with this useful mineral for many past centuries. The upper bed of Salt is

* Formerly considered to be Muriate of Soda, but it contains no Oxygen.

much discoloured by intermixture with the reddish clay that lies above and around it; but the lower stratum is of a pure white, and crystalline in its structure, breaking into cubical fragments; some of this requires only to be ground to powder, and it is quite fit for the table; the impure Salt is dissolved in vats, the earthy matter sinks to the bottom, and the clear solution is boiled and refined. In these instances, the Salt, being entirely underground is worked *in mines;* but hills and cliffs of Rock Salt are met with in several countries. Near Cardona, in Spain, is a hill of Rock Salt, said to be 500 feet in height, and there are others in Persia and Afghanistan, where the Salt is quarried and used for building. Many low plains are so much impregnated with Salt, that in dry weather it appears on the surface like hoar frost, and such spots are always frequented by wild animals, which come down to lick them, Salt being not only a luxury to them, but it would seem as indispensable to their comfort and health, as it is with man. BORAX is brought, in natural crystals, from Thibet and Persia. It consists of Soda and Boracic Acid. SAL-AMMONIAC, which is muriate of Ammonia, is a volcanic mineral, sometimes found in lava.

METALS.

The Metals, such, at least, as are most generally known to us, have a very different appearance from the minerals we have described. We immediately recognise Gold, Silver, Copper, Iron, Tin, and some others, as opaque substances possessing, among other qualities, considerable hardness, the capability of being hammered out, or drawn into wire, of becoming fluid when sufficiently heated, and having much greater weight than marble or other earthy minerals. Some of the above-named are found in the pure state in which we see them when manufactured; others, as Iron and Zinc, are obtained from stony ores, the value of which is known to the mineralogist and the miner, but by other persons might be passed by, and considered fit materials only for building or for mending the roads. There are, again, other metals, which have only been extracted from their natural combinations by the experiments of chemists, and are chiefly matters of scientific interest and curiosity; such are Tungsten, Uranium, and the metallic bases of the earths, and Alkalies. These latter, it must be mentioned, differ widely in many respects from the metals usually so-called. One peculiarity is their very low specific gravity. Aluminium, the base of the earth Alumina, which is a principal component of all kinds of Clay, has within the last three years become pretty well known, and has been manufactured into various articles of utility and ornament: they have completely the appear-

ance of Silver, but astonish the purchaser by their extreme lightness. The metal was first produced in considerable quantity in some French laboratories, and it was announced that the eagles on the French standards were henceforth to be made of Aluminium—a great saving of weight. The metallic bases Magnesium, Glucium, and Calcium, have also been extracted, but not hitherto applied to use.

Gold first claims our attention. It is hardly possible to mistake any other ore for this beautiful metal, so much does its colour excel that of all others in richness. When metals are found pure, they are called *native metals;* both Gold and Silver occur in this state, forming branches and leaf-like aggregations, on Quartz; and more rarely, with Gypsum (fig. 25). The most ancient Gold mines are, perhaps, those of Golconda; but a much larger part of the Gold used in Europe, has for many years been brought from South America, where it is found in the sand of rivers, or scattered over alluvial soil, in grains or small lumps, sometimes forming part of rolled pebbles, intermixed with quartz. But since the year 1848, Europe, and especially England, has received immense quantities of Gold, first from California, and afterwards from Australia. In both these countries, the precious metal is intermixed with loose sand and gravel, sometimes strongly coloured by ferruginous ochre; in some parts, almost on the surface of the ground; in others, at a considerable depth; and varying in size from the smallest grains to lumps, popularly called *nuggets*, weighing many pounds. Some of these which have been exhibited in England have created extraordinary sensation, fulfilling the ideas that might be excited by reading in Eastern tales, of the treasures of the Khalifs. One of the masses, exhibited in 1853, weighed 134 pounds, and when broken up and melted, produced £5532, in gold; the small remainder being quartz. Another very large nugget was afterwards brought to England, which became very well known, by being exhibited at the Crystal Palace, Sydenham: the directors of that establishment gave £500 to its proprietor for the privilege of exhibiting it; and for some time, it created great sensation. But its splendour was eclipsed by a still larger one that reached this country in 1858: its length was 2 feet 4 inches, the greatest breadth 10 inches; and the weight nearly 146 pounds. It was consigned to the melting pot on the 4th of August, and afforded pure Gold to the value of £6905 12*s.*, only 21 ounces being earthy matter. Gold has been gathered from time to time in Cornwall and

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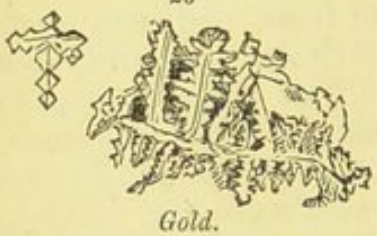

Gold.

Ireland, and in the reign of Queen Elizabeth, the gold of Scotland was coined; in the course of a few years, the quantity collected there amounted to £100,000. Gold is found always in the metallic state; never altered in its appearance by combination with oxygen, chlorine, or sulphur; but its colour varies, depending on the nature and quantity of the metal with which it may be alloyed: when pure, or nearly so, its colour is deep and rich; a mixture of 15 or 20 per cent. of Silver gives it a pale brassy colour; and the Gold of Hungary, which is alloyed by the metal Tellurium, has a grayish tint. These alloys are less heavy than pure Gold, of which the specific gravity is 19. There are Gold mines, likewise, in Siberia.

The great weight of Gold is well known; but every one is not aware that there is a metal much heavier, called PLATINUM: it was first found in South America, in the shape of small grains, of nearly a steel colour, together with granular Gold, and sometimes scales of magnetic Iron, and small crystals of Ruby and Jacinth. The Gold mines of the Urals also produce Platinum, often in larger grains than the Brazilian, varying from the size of a pea to that of a nut. Owing to its great indestructibility, both by fire and acids, Platinum is extensively employed for large vessels used in chemical manufactures, and, for some years past, has been much used in the potteries, to cover earthenware, or porcelain, in the manner of gilding.

SILVER, like Gold, is often found in the metallic state, and when first extracted from the mine, is perfectly white; but like the Silver of commerce, equally liable to become tarnished. Its crystallizations are the cube and octahedron, and the groups of minute crystals often resemble fern leaves, or the branches of fir trees; or it forms tufts of twisted wiry filaments. The Silver mines of Kongsberg, in Norway, and those of Saxony, have occasionally afforded immense masses of Silver. At Schneeberg, in the latter country, an extremely rich vein of Silver was discovered in 1478, and a block, consisting almost entirely of native Silver and ore, was cut out, which when smelted, produced 44,000 lbs. of Silver.

There are few countries in which this metal is not found, but native Silver is less abundant than some of its ores. Combined with Sulphur, it is called SILVER GLANCE: this is a rich ore of a dark gray colour, or nearly black, and of somewhat metallic lustre. The red, or RUBY SILVER, is a beautiful mineral: the crystals of the dark variety resemble a deep coloured garnet, with lustre inclining towards that of steel; the light red ore might be mistaken for clusters of spinel Rubies, being often quite trans-

parent. In this, the Silver is mineralized by Sulphur and Arsenic; the darker species contains Antimony instead of Arsenic; they are found chiefly in the mines of the Hartz Forest. There are rich and extensive Silver mines in Mexico, and in Peru, Chili, La Plata, and a vast number of districts of South America, where several kinds of ore and native Silver are intermixed.

A natural AMALGAM of Silver with MERCURY is sometimes, but rarely, met with in mines whence CINNABAR is obtained. It is perfectly white, in small rounded masses, or crystals, of which the edges are always blunt. It is very soft, and if exposed to the action of a blow-pipe, is quickly reduced to metallic Silver, the Mercury being volatilized by heat.

CINNABAR which we have just mentioned, is the chief ore of Mercury, and the same substance as artificial vermilion, namely, a compound of Mercury and Sulphur. It is not often found in the state of powder, with the bright scarlet colour of vermilion; it is more commonly massive, of a deep crimson, sometimes inclining to gray, and when freshly broken, with the texture of a fine grained marble. Mercury differs from all other metals, in being fluid at the usual temperature of the atmosphere; it can only become solid by exposure to extreme cold, when it freezes; this takes place at 71 degrees less heat than the point at which water congeals, or 39 degrees below the zero degree of Fahrenheit's thermometer.

FLUID MERCURY is sometimes found enclosed in cavities of the veins of Cinnabar, or dispersed over it in small globules. The chief Quicksilver mines of Europe, are in Idria, Rhenish Bavaria, and Spain; from the latter country, both the ancient Greeks and Romans obtained immense quantities of Cinnabar; and there are many in Mexico and Peru, where the Mercury is largely employed to separate both Gold and Silver from the accompanying minerals, by amalgamation.

COPPER is found both native, and variously combined with Sulphur and other substances, or oxydized. The metallic or native Copper, appears frequently in branching forms, resembling coralline (fig. 26), or like moss; more seldom in groups of cubic or octahedral crystals; but in North America, near Lake Superior, it fills immense veins, penetrated by fine threads of pure Silver; blocks of it have been raised, weighing many tons. With Sulphur and Iron it forms Copper pyrites, the most abundant of its ores, which may be dis-

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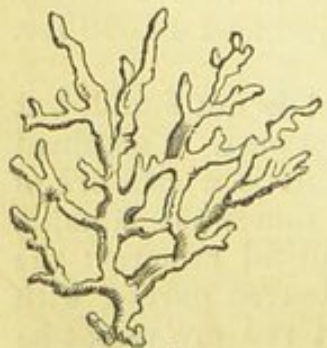

Native Copper.

tinguished from the Iron pyrites by its inferior hardness, and different crystallizations (fig. 27). Its brassy colour is often concealed by an external tarnish, exhibiting the tints of the rainbow; but this brilliant iridescence is most frequent on the VARIEGATED COPPER ORE, which is still softer, and of a deeper yellow, one-half of its weight being Sulphur. These combinations of a Metal with Sulphur, are called Sulphurets.

27

Copper Pyrites.

Is it not singular that the ores should sometimes be so totally unlike the Metals? Many earthy minerals we see frequently almost in their natural state; but few persons are acquainted with the ores of the Metals most commonly in use, or reflect on the many processes which are necessary to produce from them such articles as we call, from habit, the most simple conveniences. What can less resemble Copper than the beautiful Russian MALACHITE which excited so much admiration in the Great Exhibition of 1851? The parallel concentric bands of light and dark green, and its compact, though finely radiated structure (fig. 28) render it eminently suitable for ornamental purposes. Siberia was for a long period the only country that produced large masses of it, but within the last fifteen years very fine specimens have been brought from the Burra Burra mines in Australia.

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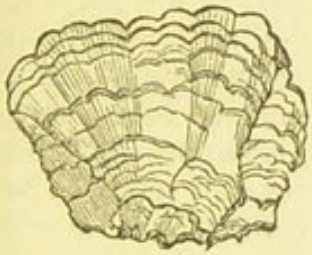

Malachite.

29

Carbonate of Copper.

The hydrate of Copper, of a fine light blue colour, is also a beautiful substance, surpassing in its soft and silky appearance the richest velvet.

There is also a CARBONATE OF COPPER, of a deep purple colour, which is usually crystallized in oblique rhombic prisms, though not always very distinctly (fig. 29). These species are scarcely known in the English Copper mines, which, however, afford fine specimens of the native Copper, Copper pyrites, the pure gray sulphuret in hexagonal crystals, and the different varieties of arseniate of Copper. The ARSENIATES OF COPPER are of a blackish-green colour, with the exception of the lenticular species, which occurs in greenish-blue crystals of a flat octahedral form, heaped together in confused groups.

30

Arseniate of Copper.

The word arseniate may require some explanation: Arsenic, which is itself a Metal, as well as Chrome, and a few others, when oxydized (or burnt), becomes an acid, and in this state unites with other Metals, the Earths and Alkalies, forming Arseniates; Chrome forms Chromates, &c.

The Cornish mines have been celebrated for many centuries. It is supposed that the Phœnicians, who were famed for their skill as armourers and braziers, procured Tin ore from Great Britain. At that period Brass (Copper and Zinc) was much less used than at present, and the principal mixed metal was an alloy of Copper and Tin, which is considerably harder than either of the two metals alone; a natural combination of these has been found in Cornwall, in very small quantity; but the oxyde of Tin is abundant, of a blackish brown colour, and usually crystallized. It is a singular fact, that though Tin is the lightest of the Metals, its ore is considerably heavier than that of Copper or Iron. The ores of the latter are numerous, but few of them possess any beauty. Native Iron is so unlike every other native Metal and ore, both in its appearance and situation, that it is supposed to be a meteoric stone. There is a mass of it on an elevated spot at the Cape of Good Hope, of which the surface is cellular, and much corroded by the atmosphere; and other masses have been found in Siberia, the desert of Sahara, and North and South America. There is another reason in favour of the supposition that these masses of Iron are not terrestrial productions; they all contain, in a hundred parts, from one to four parts of Nickel—a scarce Metal, which is remarkable for its capability of becoming magnetic. Nickel has been found likewise, in small quantity in all other meteoric stones, of which many have been seen to fall through the atmosphere. A large one, many years ago, fell in Yorkshire, and was observed by a labourer near the spot, who procured assistance and dug it out of the earth, into which it had penetrated some feet. Since this a shower of stones fell in the south of France, an account of which may be in the recollection of some of our readers.—Iron Pyrites (fig. 31) is not generally worked as an Iron ore, but for the Sulphur it contains. Its crystallizations are the cube, octahedron, pentagonal dodecahedron, and various combinations and modifications of these; it is so hard as to give sparks when struck against Steel, and will receive a good polish. In Peru it is called Piedra de los Incas, and the early inhabitants of the country made mirrors of it, some of which have been found in their tombs. Natural magnetic Iron is an oxyde, and occurs very abundantly in Sweden and Saxony, both granular and compact. The Iron Glance, another variety of the oxyde,

31

Iron Pyrites.

which is sometimes magnetic, is the most brilliant of its ores; the lustre of the crystals is indeed splendent, and they often exhibit a blue or green tarnish. Another oxyde is the red ore so common in Lancashire; the radiated variety, of a blackish red, is called Hæmatite, and the earthy kind is Ruddle, or Red Chalk. Iron Glance and Red Hæmatite, being pure oxydes of Iron, are extremely rich ores, but the Clay Ironstone is a Carbonate of Iron, intermixed with a large proportion of Clay, Silica, and sometimes Lime. This ore (already mentioned) is abundant in the Coal districts, and generally occurs in nodules, resembling large flattened pebbles, of all shades of gray and brown; these occur in a regular bed or stratum near the Coal, and many contain beautiful petrifactions of fern leaves and other extinct plants. The Phosphate of Iron, or Iron mineralized by the phosphoric acid, forms transparent crystals (fig. 32), which are of an indigo colour and prismatic; the arseniate is always crystallized in cubes, which become electric when heated (fig. 33). All the minerals which are known to have this property are characterised by a peculiarity in their crystallization—their opposite terminations are different. This is the case with the Tourmaline, with some few Topazes, and with Analcime; but that such a circumstance should be apparent in the cube, which is a perfectly symmetrical figure, is perhaps still more remarkable. The alternate angles are modified by the addition sometimes of one, and sometimes of four planes. The two last-named minerals were first discovered in the Cornish mines.

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Phosphate of Iron.

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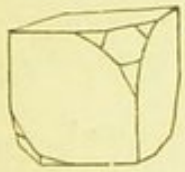
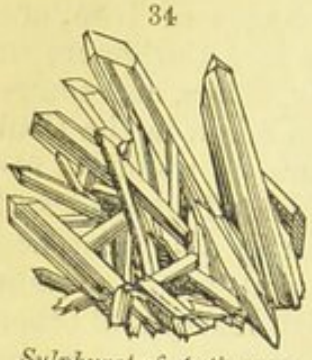


Carbonate of Iron, when pure, greatly resembles carbonate of Lime, but is harder and heavier, and has but little variety in its crystallization. There is a further distinction, namely—that by exposure to the action of the blow-pipe, carbonate of Iron becomes black, and carbonate of Lime, white and powdery. This little instrument is of the greatest utility in distinguishing the metallic ores. Many of them communicate a particular tint to the substance with which they are melted, called a flux: this may be powdered glass, borax, or soda, according to circumstances. Copper ores readily communicate a bright green colour; the ores of Manganese, a lilac tinge, which may often be observed in window-glass; when deeper, it becomes a rich violet. Cobalt, from which smalt and other fine blues are prepared, imparts this colour to the flux, which, in reducing these ores, may be either of the above-named substances. In making such experiments, care must be taken to use a very minute portion of the ore compared with

the quantity of flux: a crumb, the size of a small pin's head, being in general sufficient; and also not to expose the ore and flux, suddenly, to the hottest part of the flame.

ANTIMONY, a Metal which is applied to many useful purposes, both in manufactures and medicine, is found in combination with Sulphur, and also, occasionally with oxygen only. The sulphuret crystallizes in thin prisms, terminated usually by four small faces, forming a rather pointed summit (fig. 34): they appear perfectly metallic. This mineral is abundant in France and Germany, but not in Great Britain. The ores of COBALT are alloys of Cobalt and Arsenic, which constitutes about half the weight of the gray ore and the Cobalt glance, or bright-white Cobalt ore: these, like the native Metals, have a perfectly metallic lustre; and the crystals of the latter exactly resemble those of Iron pyrites, but are generally smaller. The greater part of the Cobalt which is used in manufactures is brought from Norway and Sweden.

34



Sulphuret of Antimony.

A very simple method of detecting the presence of ARSENIC in any mineral, is to throw a small quantity, powdered, on hot coals, or a heated shovel: the Arsenic will almost immediately evaporate in fumes, which are similar in smell to those of garlic. Arsenic is found also in a native state, of a fine granular texture, principally in Norway, the Hartz, and Bohemia.

Among the various substances that are met with enclosed in Rock crystal we must notice RUTILE, an oxyde of the Metal Titanium, which sometimes appears in crystals of a deep ruby or garnet colour, and frequently in delicate parallel fibres of lighter tint and glossy lustre, resembling auburn, and sometimes golden, hair. Beautiful specimens are brought from the granite rocks of Dauphiné, and, when cut and polished, are used in jewellery and called *Venus' hair*.

Those beautiful yellowish-green, transparent crystals, which we find dispersed over the Adularia and Quartz, are called SPHENE, an ore of this Metal, in which it is combined with Lime and Silica. They bear considerable resemblance to the Chrysoberyl, but are not so hard: the finest are brought from St. Gothard. The name Ligurite was given to these crystals in reference to their locality in the ancient *Liguria*, and a supposition that from their hardness and brilliancy they might be the "Ligure" of Aaron's breastplate (fig. 35).

35

Sphene Crystals.

It is disputed whether native LEAD has ever been observed: the

sulphuret, which is abundant in Saxony, Sweden, and some other parts of Europe, but most particularly so in Great Britain, has a perfectly metallic appearance, and crystallizes in cubes, octahedrons, and other secondary forms; but it is more frequently massive, with very distinct and bright cleavages, parallel to the faces of the cube—its primitive form (fig. 36). It is frequently called *Galena*: SLICKENSIDES, a variety of this, causes some alarm to the miners when they discover it, on account of its liability to explode if it be scratched. There are brilliant colourless crystals on some of these specimens, which so much resemble the diamond in the intensity of their lustre, that, were they not so soft, they would supersede every other imitation of that valuable gem: they are CARBONATE OF LEAD, from the Lead hills in Scotland—so called from the mines they contain. The CHROMATE OF LEAD (fig. 37), which is peculiar to a Gold mine of Siberia and a small district of Brazil, is crystallized, and its orange-red colour is rather remarkable: when bruised, the powder is of a deep rich yellow; in fact, it is the same composition as the artificial Crome yellow.

36

Sulphuret of Lead.

37

Chromate of Lead.

The PHOSPHATE OF LEAD is green, and often has a velvety appearance, similar to that of the radiated carbonate of Copper; but you will not be liable to mistake them, if you bear in mind that the colour of the Lead ore is so much more yellow than that of the Copper. You would probably imagine the yellow part of this specimen to be a fragment of Mica: it is the sulphuret of Arsenic, called ORPIMENT. Nothing can be more beautiful than the mixture of this golden Micaceous substance with the red variety, which is granular, or crystallized. Arsenic is most commonly known in the form of white powder, which is an oxyde artificially prepared. By the application of heat, the Sulphur burns away with a blue flame, and the Arsenic is volatilized.

The ores of MANGANESE are mostly black or dark brown; the peroxyde (that which is most highly oxydated) appears sometimes in groups of small brilliant crystals resembling cut steel, together with massive and earthy varieties. Although not found in such abundance as Copper and Iron, it is very widely dispersed through the mineral kingdom; often combined in small quantity with earthy minerals and the ores of metals, particularly of Iron. There are mines of Manganese at Upton Pyne, in Devonshire, whence it is obtained for various manufacturing purposes, especially for the production of Chlorine, so much used in bleaching; and in

glass-making, where it is employed to destroy the green tinge that is often perceptible in glass.

INFLAMMABLE MATERIALS.

Sulphur is, of course, arranged in the Inflammable class: it is of two kinds, native and volcanic; they are both, usually, semi-transparent, and may be distinguished by the difference of their colour; native Sulphur is of a bright lemon yellow, and sometimes crystallized; the volcanic kind is deep orange, and often prettily contrasted with groups of white crystals, which are Sulphate of Strontia (fig. 38). The principal part of the Sulphur which is consumed in the European manufactures is obtained from a remarkable natural deposit at Solfatara, near Naples; but the most beautiful crystallized specimens are found in Spain.

38

Sulphate of Strontia.

At the beginning of the Carbonaceous genus, is placed the Diamond; certainly not from its external resemblance to the Coal family, but because it is known to be Carbon in its purest state. This fact, which is proved by its combustion at a very high temperature, was suspected as early as 1609, by the learned Boetius de Boot, and in 1694-95 confirmed by experiments made in the presence of the Grand Duke of Tuscany; for the result of the operation was the production of carbonic acid gas, or *fixed air*, which is always produced by the burning of charcoal or any carbonaceous substance. In hardness the Diamond exceeds all known substances, and on this account, probably, it was so highly valued by the ancients, although they were unacquainted with the manner of cutting and polishing it. There is, in the British Museum, an antique Diamond ring, probably of Roman workmanship; the setting is of pure Gold, and the Diamond a natural octahedral crystal, rather elongated. It is not, however, brilliant, although some crystals exhibit surfaces as resplendently bright as the faces of cut ones. Even in the eighth century the art of cutting Diamonds, which was practised in the East at a very early period, appears to have been unknown in Europe; for the clasp which ornamented the imperial mantle of Charlemagne, and is still preserved in Paris, contains four rough Diamonds.

The crystals of the Diamond are somewhat peculiar; they are almost always unattached, and the surfaces have most frequently a tendency to convexity. The dodecahedron, of which the faces are divided into four triangles, slightly convex, and the octahe-

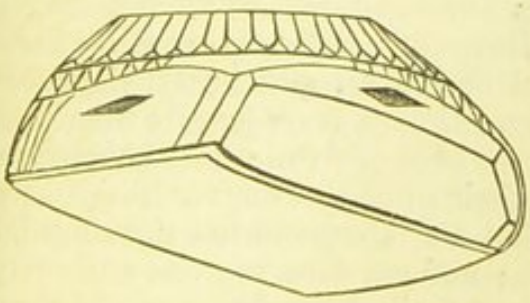
dron, having edges replaced by narrow convex planes, are forms very frequently met with, particularly among the Brazilian Diamonds (figs. 39, 40). They are occasionally found quite spherical, with a slightly crinkled surface: this form appears to be the result of a confused or imperfect crystallization; for the round Diamonds are not cleaveable, while the crystalline ones may readily be split in four directions, parallel to the planes of the octahedron—their primary form; for this reason the Diamond cutters consider the round ones to be harder than the others, and call them *Iron Diamonds*. In their natural state, Diamonds seldom possess that brilliancy which renders them, when cut, strikingly superior to other gems; the surface of the crystals is very generally rough and dull, and it is not surprising that persons unacquainted with their natural appearance should, in the Diamond districts, have expended large sums in the purchase of crystals of Quartz and fragments of Topaz. Lord Anson, in the relation of one of his voyages, says that, in Brazil, Diamonds, when found in the Gold washings, were usually thrown away as worthless, until a few of the larger ones, retained for counters, were seen in Europe, and their value made known to the Portuguese government.

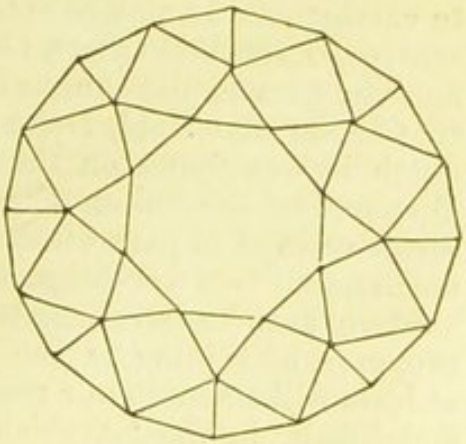
39

40

Diamond Crystals.

India, the first known repository of this precious gem, has produced all the finest Diamonds at present known in Europe, which are remarkable for their size. The KOH-I-NOOR, or Mountain of Light, which will be ever remembered by all visitors to the Great Exhibition of 1851, was procured from Golconda. It is truly a superb stone, and though diminished in size by recutting, has gained considerably in symmetry and brilliancy. The accompanying figures (of the real size) represent its present and former state.





Its weight when brought to England was one hundred and eighty-six carats. Another diamond, very celebrated for its great size and purity, adorns the sceptre of the Emperor of Russia; it is as

large as a pigeon's egg, and is said to have been once the eye of a Brahminical idol, from which it was stolen by a French soldier. After passing through other hands, it was purchased by the Empress Catherine for the enormous sum of ninety thousand pounds, ready money, an annuity of about four thousand pounds, and a title of nobility! Its weight is said to be one hundred and ninety-five carats. It may be proper here to observe, that the weight of Diamonds is generally estimated by the carat, which is equal to three grains and two fifths, troy.* In 'Les six Voyages de Tavernier,' published in 1676, we read of an immense Diamond called the Koh-i-noor, in the possession of the Great Mogul: it is said to have weighed between seven and eight hundred carats, before it was cut *or broken;* and the suggestion offered by Professor Tennant seems highly probable, that the present Koh-i-noor is a portion of it, the large under surface being evidently a plane obtained by cleavage; he further thinks it probable that the great Russian Diamond, and a third very large one, "found at the capture of Coochan, among other jewels in the hareem of Reeza Kooli Khan," may all have been portions of one crystal; for "the marks of cleavage on the latter appear to correspond with those on the Koh-i-noor of Her Majesty; and their united weights make up, as nearly as possible, that of the Great Mogul's Diamond."

The Emperor of Austria possesses a splendid Diamond, of a lemon-yellow colour, weighing one hundred and thirty-nine and a half carats, the largest known of that colour.

The Pitt, or Regent Diamond (so named from the Englishman who brought it from India, and the Regent d'Orleans to whom he sold it), which decorates the state sword of France, is nearly of the same weight, and of the purest water.

There are many other fine Diamonds, remarkable for their size, well known to jewellers and collectors, which it would be tedious to catalogue. It may be sufficient to mention a very fine one, presented to the late Queen Charlotte, which weighed one hundred and one carats; the famous Sanci Diamond, said to have belonged to Charles the Bold, Duke of Burgundy, after whose defeat and death it was found on the field of battle; and lastly, the great Diamond of the Sultan of Borneo. Many years ago its then possessor refused to part with it for an offer of five hundred thousand dollars, and two war-brigs, with their guns and ammunition.

Many authors have asserted that the Diamond has the singular property of shining in the dark; and we dare say one authority at least will occur to our readers; we allude to the story of Saad and Saadi, in the 'Arabian Nights.' The fact is, however, disputed, or at least the property is believed to exist only in particu-

* The Diamond-merchants, however, call the quarter of a carat, one grain diamond weight.

lar specimens. Diamonds are found in the beds of certain streams of Golconda and Brazil, in detached crystals or grains, intermixed with Sand and Quartz Pebbles, but very rarely imbedded in any rock. There is but one species of Diamond: it stands alone in hardness and in brilliancy; in value it has always been allowed a superiority over every other stone. Though their colour and numerous flaws may unfit them for jewellery, Diamonds are useful for so many purposes, that those of the most inferior quality have considerable value; small splinters, such as are split off in giving the first rough shape to large Diamonds, are set as drills to pierce other hard stones, such as are used for wire-drawing and in watch-jewellery. Seals, Cameos, and Intaglios, are engraved by means of Diamond tools. Sheets of glass are cut into any required form by the glazier's Diamond, which must always be *a natural crystal;* for though any Diamond will *scratch* glass with the greatest ease, the glass will not *break* along a line drawn by a fragment. Fragments and refuse of Diamonds are broken up and pounded in a steel mortar, and the dust is used to cut and polish both Diamonds and other precious stones; this is called *Bort*, and is worth about fifty pounds an ounce.

Coal is a combination of Carbon, earthy matter, and Bitumen or Petroleum, which is a black substance, generally oozing in a liquid state from beds of Coal; but sometimes so much indurated as to be solid, and either brittle or soft and elastic. When hard and brittle, it is called Asphaltum; a great deal of this has been for some years applied to forming pavement, by being heated and mixed with broken Granite. The famous Pitch lake of Trinidad is entirely filled with this substance, which along the shore is solid, but at a little distance it is warm and soft, and the temperature increases towards the centre, where it is quite liquid, and appears to be in a state of ebullition, as if it filled the crater of a sunken volcano. When Petroleum is liquid, it is applied to the same purposes as vegetable tar; it is the substance with which the huge bricks of Babylon were cemented; it was used by the Egyptians in embalming; and at the present time the boats on the Tigris and Euphrates are *tarred* with Petroleum. Naphtha, which may be distilled from it, also occurs naturally, flowing through sandy soils, or floating on streams of water. It is a much thinner liquid than Petroleum, of a pale yellowish colour. The city of Parma is lighted with Naphtha, which is collected at Amiano. In the north of Persia, Naphtha is abundant; and at Baku, on the western shore of the Caspian, may still be seen the remains of temples dedicated by the former inhabitants to the worship of fire. If a small hole be made to the depth of a few inches, and a tube inserted, Naphtha is immediately obtained; and being highly inflammable,

and the source apparently inexhaustible, it was thought to be of sacred origin, and kept constantly burning.

Anthracite, or mineral charcoal, is a variety of Coal, which contains little or no Bitumen; it is admirably adapted for burning in furnaces, as it forms no soot, but requires greater heat than we can obtain in our open grates or common chamber-stoves.

Jet is a variety of Lignite, or Bituminized wood; although it is very compact, and has a brilliant lustre when broken, the structure of the original wood is often visible.

Graphite, or Plumbago, more commonly known as Black Lead, is nearly pure Carbon, and therefore is arranged near the Diamond, though so unlike it in all respects, except its composition. It is found in many parts both of the Old and New Continent; it has been brought of very good quality from Ceylon, but that of Borrowdale, in Cumberland, is considered superior to any other. The refuse and small fragments of Graphite are ground to powder, which is much employed to diminish the friction of machinery.

Before we conclude, a few hints as to forming a collection of minerals will, we doubt not, prove acceptable. The young naturalist is recommended to begin with a moderate-sized cabinet, such as will contain eight or ten drawers, about two inches in depth, and one still deeper at the bottom, for large specimens. If it be thought desirable to purchase a small arranged collection, the cabinet should be considerably larger than sufficient to contain it, in order to leave room for additions. The minerals should be placed in card trays, about half or three quarters of an inch deep; and empty trays, with the names of such substances as the collection does not contain, should supply their places until procured. Minerals are sometimes laid on jeweller's cotton; but it is not a good plan, because the cotton is apt to become entangled in the crystals, or other minute parts of the specimens. If they are so tender as to require some soft substance in the trays, the cotton should be covered with tissue-paper. They may thus be conveniently examined without being actually handled, which is very injurious to many minerals, and particularly to the fractured surfaces, which are often characteristic of the substance. It is true that there are many minerals which may be washed with impunity, and even brushed with soap and warm water (taking care to rinse them well afterwards)—such as most of the Quartz family, the Fluor Spar, Heavy Spar, and many others; but there are others, such as the Micas, Salts, and many of the more delicate ores, which would be destroyed by such a proceeding. Several, however, would bear dusting with a very soft brush. Specimens of Sulphur are better preserved by baking them for a few hours in a moderately-heated oven than by any other method.

CONCHOLOGY.

A brook, with banks of shells, flowed through the grot;
And oft the deer, amid the noontide heat,
Trooping, to lave their lips in that cool stream,
Were startled by the student and her lamp.

ROUD as the botanist may be of the Lily, and the mineralogist of the Diamond, the Pearl, "that jewel of the sea"—although it does not possess the delicious odour of the flower, nor the splendid brilliance of the gem—has beauties peculiar to itself, which, in the opinion of many, entitle it to an equal rank with either of them. Pearls are familiar to the eyes of most of our readers; all of whom have seen, and many of whom have worn them as ornaments. Some of their work-boxes are inlaid with Mother-of-Pearl, or their silk-winders made of the same material. The Pearl is, doubtless, a favorite with our young friends, and we imagine that we shall be more likely to attract their notice, and secure their attention, at the outset of our article on Conchology, by adverting to an object familiar as it is beautiful, than if we began by describing the various shells with which the "soft savage" of some far-distant island decorates herself, at her rude toilet in a wicker canoe; or the Cowries circulated by the Africans as cash; or even the Scallop worn by the pilgrims of olden times. Pearls are of considerable importance in a commercial point of view, and, we need scarcely mention, exceedingly valuable when fine. A great number of persons are employed about the coasts of Ceylon and China, in obtaining the shells which produce them. They are formed from a deposition of the substance destined to

line the shell, upon sand, fragments of shell, or other matter that has been, either accidentally, or purposely, introduced within the mantle of the animal, or through a hole in the valve. The best Oriental Pearls are found in the Pearl-Oyster (*Avicula margaritifera*). The shell itself is the Mother-o'-Pearl used for inlaying, &c.

Those elegant ornaments, the Shell-Cameos, are formed of shells like the Queen-Conch (Cassis), whose several layers possess different colours. Knife-handles and other things have been made of the great Clam (*Tridacna gigas*). That celebrated ancient dye, the Tyrian purple, was obtained from a kind of Whelk (*Murex trunculus*); and, without multiplying instances, it may be sufficient to remind our readers that shells have, in all ages, supplied mankind with numerous ornaments, and many useful articles.

One very general employment of shells is gone out of fashion; but may perhaps be revived by some of our juvenile friends; we allude to the imitation of flowers with shells. The stems may be made of twigs, or of wire, covered with silk. The shells should be selected with taste, pressed into wax forms, or fastened on with gum arabic mixed with white starch powder, so as to resemble a natural flower. Shells suited to the purpose are commonly imported from the West-Indian Islands. Another, and more common use of shells, is the embellishment of grottos. In the adoption of shells for this purpose, either on a large or small scale, more attention should be paid to Nature than is usually done; thus—if a hut or cavern is to be imitated, the materials should be consistent with the scenery around it. A rustic hut, made of rugged trunks or branches of trees, should be placed in a wilderness, which may be supposed to furnish such, and no better, materials: it should be enriched with land shells; or, if a spring be constructed near it, river shells may be added—all disposed in forms, apparently unstudied, filling crevices, crowning natural projections, or grouped in careless clusters. Shells fit for such a purpose may be found in almost every hedge and stream. For a cavern, the place chosen should be either among rocks, or upon uneven rising ground, well covered with underwood; in the former case, a view of the sea will greatly improve the beauty of the design. Shells, placed in small clusters, may mark the approach to the cavern; little projections or hollows, in its immediate vicinity, may also support or contain either single shells or groups, the largest and plainest being selected for such situations; the cavern itself, if constructed with a very uneven surface, will afford shelter for the most gaudy or delicate kinds, which may here be lavished in the greatest profusion. As the whole must look like the work of an untaught admirer of Nature, or one unprovided with tools, the shells should appear to be supported by each other,

or by fragments of rock, coral, or sticks; and by no means be so arranged that without cement they would naturally fall; neither should their supports, especially if made of wood, seem placed in the positions they occupy, for no other purpose than to hold up the shells. The same observations will apply to small grottos. Rocks or turf may be well imitated by rough cork, glued and pinned together, painted or covered with moss. Small-leaved evergreens and moss will also serve for the vegetable scenery; glass for water; and a painted landscape, or sea view, may fill the back ground. It will conduce much to the beauty of the grotto, to group many shells of a colour, and to avoid great contrasts. Light colours suit best in the centres of masses, and dark ones in retired situations. Much taste may be displayed in the disposition of shells, when used for these purposes. Houses and little figures are sometimes covered with shells, so as to appear very grotesque and whimsical.

The animals of different tribes of shells are destined to perform various offices; such as to remove and change the character of dead, or dying organized matters; to check a superabundant increase of other small animals and vegetables; or to supply food for some of those larger animals which are not formed to live upon vegetables. Some families of shell-fish even live upon others. To perform their several functions, we find them placed in the sea, in fresh water, and on the land. The greater number of the land-snails feed upon vegetables; and a few on dead animal matter. There is also a small number of fresh-water snails: these, and the animals of such marine Univalves as have a round aperture, feed on vegetables, or horny zoophytes, which they bite, by means of a horny upper jaw, in the same manner as the land-snails. The animals of those Univalved sea-shells which have a notch or canal at the base of the aperture, are carnivorous; by means of a retractile proboscis of variable length, and containing a tongue armed with minute teeth, they bore through the shells of such animals, chiefly Bivalves, as are destined for their prey. The Bivalves are all aquatic, and feed on animalcules and minute vegetable organisms belonging to the lowest order of sea-weed (*Diatomaceæ*). For the first two offices assigned to them, shell-fish are but feeble agents. As food for other creatures, they are of great importance, being exceedingly prolific, and forming the most delicious food to many tribes of animals whose stomachs are fitted for the reception of them, or to such as are especially endowed with skill enough to deprive them of their shells. They form the principal support of the great Whale, of many sea-birds, and of the Codfish and Turbot, and other ground-feeding fishes. It is almost superfluous to mention, that the animals of several shells, such as the Oyster, the

Mussel, the Scallop, &c., afford food for man. The Common Snail (*Helix aspersa*), and the Roman Snail (*Helix pomatia*), when boiled in milk, are said to afford a light and strengthening diet for invalids. The Razor-fish (Solen) is eaten in Scotland; and most of the shell-fish that live in the sea may be safely eaten, if fresh; those found in fresh water are not palatable.

Shells are formed of carbonate of lime, and serve to contain and protect the soft animals to which they are united, and that have no internal bones. Shells are constructed by their inhabitants (if animals contained in cases, which are essentially part of themselves, can be called inhabitants) of a deposition from their mantles, or thick, soft membranes that inclose their bodies. As the form of the animal, or its mantle, varies, so also does that of the shell —a certain form or part in one, always indicating a corresponding form or part in the other; therefore, by the knowledge of a few of the animals and their shells, we are enabled to conceive some idea of the inhabitants of other shells, whether living or extinct. There are six principal forms or classes of these animals which generally possess shells, properly so called, in the restricted sense of the word. These classes are—

1. TUNICATA.
2. CONCHIFERA.
3. BRACHIOPODA.
4. PTEROPODA.
5. GASTEROPODA.
6. CEPHALOPODA.

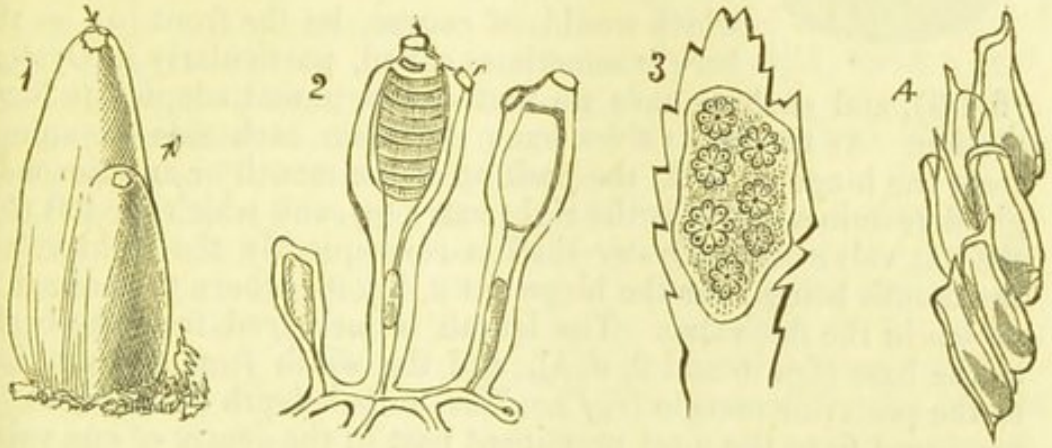
The forms of the shells in these divisions are so materially different, that we shall explain the terms used to describe each class separately, and follow these observations with a slight notice of some of the genera.

1. TUNICARIES. (Tunicata.)

The first and lowest class of molluscous animals are inclosed in and protected by a sort of leathery envelope or tunic, instead of a shell. They are marine animals, attached to sea-weed and shells and stones. The tunic has two orifices, from one of which a stream of water constantly issues, whilst a similar current enters by the other opening.

The tunicated Mollusca were called "Ascidians" by old writers, on account of their resemblance to a leather bottle (*Ascidium*). Some are solitary (fig. 1), others form little societies, in which the parents and children are united by a common, root-like, bond of union (*Clavellina*, fig. 2). A third group consists of compound animals, more like zoophytes than shell-fish in outward appearance; they sometimes invest the fronds of sea-weed with their flower-like colonies (*Botryllus*, fig. 3). All these forms may be seen in the *aquaria* of the Zoological Gardens. A fourth kind

(*Salpa*, fig. 4) is only met with in the open sea, and is sometimes solitary, at others united in long floating chains. The most curious part of their history is the fact that the solitary Salpæ give



birth to chains of small tunicaries, and these again produce solitary individuals; so that, as their first discoverer, the poet Chamisso, observed, "a Salpa mother is not like its daughter or its own mother, but resembles its sister, its granddaughter, and its grandmother." To this group also belongs the *Pyrosoma*, a compound animal, in the form of a hollow cylinder, about ten inches in length; it is found in shoals, and gives out a phosphorescent light, by which, according to Humboldt, the fishes are visible.

2. BIVALVE SHELLS. (Conchifera.)

The second class of molluscous animals, Conchifera, have two conspicuous valves, united by a hinge to each other. They present a great diversity of form, as well in their shells as in themselves. They inhabit both fresh and salt water, and are often gregarious in vast numbers, like the Oyster, Mussel, and Cockle.

Before we detail some of the many genera of Bivalve shells, it will be necessary to enter into an explanation of the terms used in describing them: we shall do this as briefly as we can, and, at the same time, make such allusions to the form and parts of the animals, as will show the dependence of the shells and animals upon each other. A Bivalve shell is composed of two valves (fig. 5, *a*, *b*,) united by the hinge-ligament (*c*); on each side of it are curved prominences, called the beaks (fig. 6, *d*), from which the growth of the shell commenced. That part of the margin, near which the mouth of the animal is placed, is the anterior side (*e*); the opposite is the posterior margin or extremity (*f*);

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between the posterior margin and the beaks is the hinge-slope and line (fig. 6, *g*); and opposed to the beaks is the base (*h*): the hinge-slope is situated over the back of the animal, parallel to which would, of course, be the front (*h*), as the base is sometimes called, particularly in Oysters (fig. 9), and such as have no foot or instrument adapted to locomotion. As the two valves hang down on each side the animal from the hinge or beak, the position of the mouth or anterior margin determines which is the right valve (*a*), and which the left (*b*); the flat valve of an Oyster-shell is consequently the right valve, the mouth being near the hinge (at *a*, fig. 9), where the animal is shown in the flat valve. The length is measured from the beaks to the base (figs. 6 and 9, *d*, *h*), and the width from the anterior to the posterior margin (*e*, *f*). The united depth of the valves is measured from the most prominent part of the centre of one valve to the corresponding part of the other, when they are closed, and the shell is either compressed, convex, or gibbose (much swollen), in proportion as this measure is small or great: it is said to be equal-valved when both valves are alike, and unequal-valved when one is deeper than the other. A Bivalve is equi-lateral, or equal-sided, when the distances from the beaks to the anterior and posterior margins are equal; when one exceeds the other, it is said to be inequi-lateral, or unequal-sided.

Some shells have a flattish, heart-shaped space, marked out under the beaks, upon the anterior side, by an impressed line:—

this is the lunette (fig. 7, *a*): others have angular projections on one or both sides of the beaks, which are termed ears (fig. 8, *a*). The surface is rough, or smooth, or ornamented with striæ (fine lines), furrows, ridges, or ribs: these are either concentric when parallel to the margin, longitudinal when perpendicular to it, or oblique when between the two: the lines of growth are always concentric. The surface is sometimes decorated with scales or spines, and with a variety of colours, variously and elegantly disposed. Some of the animals of this class have additional accessory valves, generally very slender, placed upon their backs, either before or behind the beaks: and some form shelly tubes, that inclose them entirely, valves and all: most of them are covered with a membranous epidermis (or skin).

The interior of Bivalve shells contain a few parts highly essential in distinguishing the genera from each other. The surfaces to which the ligament is attached, are generally external,

upon a raised part of the margin of each valve, called the fulcrum; but sometimes, as in Oysters, the ligament is internal, or within the beaks; it is then seated in the hinge-pit (fig. 9, *d*): in others, the two parts, of which the ligament is composed, are separated; one part being internal, in a pit; the other, external and marginal: near this are frequently several teeth; and, sometimes, at a little distance along the margin, other remote, lateral (or side) teeth. The teeth of the two valves lock into each other, and serve to steady them.

It is necessary, for the purpose of explaining a few marks within the shells, to give a slight description of the animals which they contain. For illustration, we select the Oyster and the Mussel. An Oyster, when lying on the right, or flat valve, as it is generally exhibited (fig. 9), shows the following parts:—the body (*b*); the mantle, composed of two lobes (*c*); the muscle (*g* and *i*), by which it closes and holds its valves close,—the internal part of the ligament being a spring that opens them; the white heart (*k*), and its brown auricle. If half the mantle, or dark-edged beard, be turned back, four striated laminæ (or frills) will be exposed (*l*); these are the branchiæ (or gills); following these, towards the hinge, along the anterior margin, four other pointed laminæ will be found; these unite in two pairs, each like the letter V reversed, and are the lips, or palpi (*a*); the mouth is round, and placed in the centre, between the lips: there is neither head nor eyes. Upon attempting to turn up one lobe of the mantle, towards the posterior margin, it will be found connected to the other lobe (at *m*): this is the rudiment of a more considerable junction observed in some other Bivalve shell-fish.

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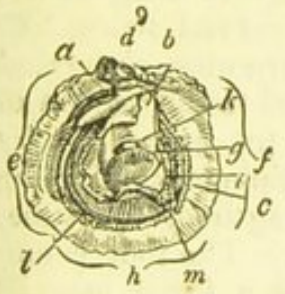

The Mussel (fig. 10) is a more complicated animal than the Oyster. The mouth may be observed at the small end of the shell, furnished with four long *palpi;* the two *adductor* muscles which close the shell, are placed, one in front (*a*) and one behind (*b*); there are also muscles attached to the foot. The foot of the Mussel (*e*) is shaped like a tongue; and the byssus (or beard), at its base (*f*), is used by the animal to fasten itself to other bodies: it is formed of a number of threads, each expanded at the end. The foot is employed, not only to remove the animal from place to place, but to fix these fibres so as to moor the shell, when necessary. The two lobes of the mantle are fringed near the posterior extremity (*c*), at the part where they admit food to the

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mouth, and water to the gills within them, and then unite so as to form a short tube (*d*) for the exit of the water, &c. In some shells, this fringed part is also formed into a tube, and the two tubes pass together out of the shell: when these tubes are large, as in the "Gaper" (*Mya truncata*, fig. 11), the posterior extremity of the shell gapes for their passage, and the epidermis is produced so as to inclose them.

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The Cockle also has two muscles to close the valves, and two short siphonal tubes, but no byssus. Within all Bivalve shells, circular impressions may be observed, which are the marks of attachment of the above-mentioned muscles, and are, therefore, called muscular impressions (fig. 12, *a*): when there are two of them, an irregular impression may be traced from one to the other, called the "pallial line;" upon this the mantle was attached by a series of muscles: if the mantle be formed into long tubes, the line of its attachment is curved twice, like the letter S, with one extremity elongated (*b*, *c*): the portion not parallel to the margin of the shell, termed the sinus (*c*), is caused by the retractor muscle of the siphons, and being deep in proportion to the length of the tubes is often of importance in distinguishing genera. The foot is employed, either to draw the animal forward, as a leech uses its sucker, or to push it the contrary way. It is easy to obtain a sight of the first method, by watching, for a few minutes, in a basin of water, a small Bivalve, that is very common in rivers, ponds, and ditches, called the Cyclas (fig. 13). The presence of the byssus is indicated by an opening between the edges of the valves, in the base, or near the front of the shell.

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The Bivalve shells are divided into two orders: first,—those with two muscular impressions in each valve; second, those with only one. The orders are divided into smaller sections, or families, characterised by the form of the shell, or some of the parts of the animal above described. We shall proceed to notice a few of the most remarkable genera.—The Aspergillum (fig. 14), or Watering-pot, is a tube closed at one end by a convex disc, perforated by many holes; the disc is surrounded by a frill of short, small tubes; upon the back of the large tube are rudiments of two valves which are very small, and blended with the substance of

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the tube: it lives in sand. Clavagella (fig. 15) has a very irregular tube, with branches at the closed end, and one or more ruffles at the siphonal extremity; within it is one free or moveable valve, united by a ligament to another, which is combined with the tube: it lives in sand and coral. Gastrochæna forms a burrow, containing two free valves which are united by a ligament: it works its way far into shells and corals (fig. 16). In the first-mentioned two genera, and some others, the animal is partly attached to the shelly tube; in this, and the following, the tube is quite distinct from the animal, which deposits it only as a lining to the hole it lives in. The Ship-worm, or Teredo, is also inclosed in a shelly tube; its valves, gaping at both extremities, are too small to hold the whole animal; the front opening, formed by an angular notch in each valve (fig. 17, *a*), allows the small flattened foot to be exposed; through the posterior opening, a long tube passes, which is by far the most considerable part of the animal: at the extremity of the tube two spoon-shaped "pallets" are attached, at the base of the small siphons (fig. 17, *b*); within each beak is a slender curved process, to which muscles, connected with the foot, are attached. The Teredo attacks wood in the sea, whether floating, or employed in dams and breakwaters; it was the terror of the Dutch, and the scourge of navies before metal-sheathing was invented: it has destroyed the Russian fleet sunk in the harbour of Sebastopol. The egg being hatched, the young fry, as soon as it has fixed itself upon the surface of the wood, begins to work its way inward, and continues to proceed to a greater depth as it grows larger, or the wood wears away, forming a crooked hole (*c*), not half an inch in diameter, but many inches long, and lining it with shell. The Ship-worm forms its burrow *mechanically*, either with its shell or by means of the exposed portion of the mantle; it swallows the impalpable powder thus produced. The flat extremity of the foot has been supposed to act as a sucker, by which the animal draws the valves close to the wood; and a semi-circular motion is given to them, by means of the muscles attached to the internal processes above mentioned; so that, their edges being very sharp, they soon cut away a portion of the wood; by shifting the foot, and repeating the process continually, they bore the required tubes,—the foot acting as the short screw at the end of a gimlet. As the animal grows, the edge of the shell is renewed; and thus is always sharp.

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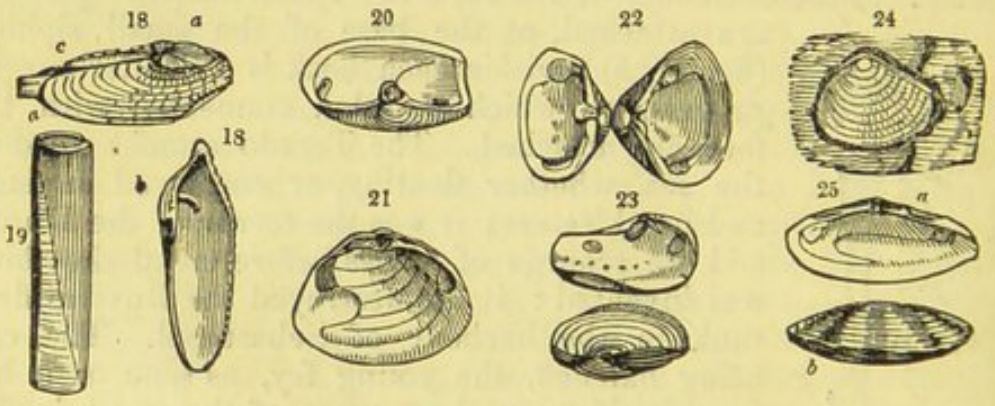
The Pholas in its general structure, is much like the Teredo (fig. 18, *a*, *c*, the accessory valves; *b*, the internal curved process); but it has longer valves, capable of containing nearly the whole animal. The surface of the shell is rough in front; and it works its way into wood, chalk, or any soft stone, as the Teredo does into wood only. The Solen, or Razor-fish (fig. 19), is an instance of a shell many times wider than long; the animal has a very large foot, by which it can draw its shell up and down, perpendicularly, in sand on the sea-shore, with great rapidity. In Mya (fig. 20 and fig. 11), the broad tooth in the hinge is remarkable; the siphonal tubes are covered with rough epidermis, and project far beyond the truncated (or shortened) gaping extremity of the valves. Mactra (fig. 21) is an example of an interior ligament accompanied by lateral teeth. Corbula (fig. 22) is another example of internal ligament: the valves are, also, unequal, neither alike in convexity nor size; the animal has a slender foot, and the hinge one curved tooth. Pandora, and other shells of the same family (*Anatinidæ*), are pearly; one valve is quite flat, and the other curved (fig. 23).



Petricola (fig. 24) is a rather short Bivalve, with two thin teeth in one valve, and one or two in the other; it belongs to a remarkable group of shells, that bore holes in rocks, not by mechanical power, as the Pholas does, but apparently by means of some solvent discharged upon the stone: they are confined to calcareous rocks or corals; the holes they make fit them with such nicety, that they cannot turn round in them. Tellina (fig. 25) is a common genus of elegantly formed and coloured shells, belonging to a family that have the fulcra, supporting the ligament, very prominent (fig. 25, *a*); most of the species are tender, flattish shells, and are known by a slight bend in the margin of the base, towards the posterior extremity (fig. 25, *b*). Cyclas (fig 13) is one of the few BIVALVES that inhabit fresh water; the British species is roundish and less than a nut. Venus (figs. 7, 12, and 26) is a

sea-shell (fig. 26, *a*, is the hinge). The species collected under this genus have been so named because, among them, Nature has eminently displayed her power of producing a great variety of beautiful forms and colours; a heart-shaped impression on the anterior slope, called the lunette, is characteristic of the genus. The Cardium (fig. 27), or Cockle, is the type of the next family. This well-known shell has two pairs of remote teeth—one pair at each end of the hinge-line; it has also a lunette, sometimes deeply impressed. The structure of the shell is radiated, and the surface, consequently, ribbed longitudinally with toothed edges.

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The Ark Shell, or Arca (fig. 28), is most conspicuous in the next family; of which, a number of small teeth, arranged in a line along the hinge, mark all the genera; a flat space, or area, between the beaks occurs in several. In Arca, there is an opening between the front edges of the valves, for the passage of the byssus, or beard. Trigonia (fig. 29) is a strong, beautiful, pearly shell, and the only species of its genus, or member of its family, that has not been wrecked in the current of time, which has buried so many antediluvian races beneath the surface of the earth. The hinge teeth are strongly striated, with small furrows.

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The River-mussel (Unio, figs. 5 and 6) is one of a family that shuns salt water, and, indeed, cannot live in it: the smooth olive-green epidermis that covers its even surface, is characteristic of shells peculiar to fresh water; but, although it is strong, it does not wholly protect the calcareous shell from the feeble acids given out by decomposing vegetable matter at the bottoms of lakes and rivers: the beaks are, consequently, often corroded, like the spires of Univalve shells under the same circumstances. The Pearl-mussel (*Unio margaritiferus*), common in all the mountain streams of Britain, afforded the best pearls known to the ancients. The Chinese insert strings of beads and little metallic idols beneath the mantle of *Unio plicatus*, and cause them to become coated with pearl.

The Ætheria (fig. 31) is another fresh-water shell, without teeth in the hinge, very irregularly formed, and pearly; it is found in the upper parts of the Nile. The edible Mussel (*Mytilus edulis*, fig. 10) is the type of the next family. The shell is pointed in front (*a*), and broadly wedge-shaped behind. The animal has a small, finger-like foot, and moors itself by a byssus of many

strong threads. Chama (fig. 30) is the only recent example of the last family of shells with two muscular impressions. They attach themselves to rocks or stones by the substance itself of one valve. The Chama is a sea-shell, with a pair of thick teeth in the hinge, and squamose, or scaly, surface.—The Bivalve shells with only one muscular impression are less numerous than the others; they, for the most part, are attached to other BIVALVES by the shell, as Oysters; or by a byssus (beard), as the Pearl-oyster. The first genus is Tridacna (the Clamp-shell, formerly called a Chama, fig. 32). It is the most ponderous shell known; the margin has deep angular notches and large squamose ribs; the valves are equal. The Wing-shell (or *Pinna*, fig. 33) belongs to the next family. The anterior extremity is pointed; the other end is truncated (as if cut off) and open (*b*); the shell is extremely brittle, being composed chiefly of fibres perpendicular to the surface, with only a thin and partial layer of pearl. Avicula (fig. 34) is a shell resembling a Mussel, with a projection on one side, which gives it the general form of a bird's wing; the hinge-ligament extends along a part of the edge. Malleus (fig. 35), or the Hammer Oyster, has often two similar projections or ears; but the ligament is confined to a small space beneath the beaks, and below it is a sinus for the byssus (*a*). The Oriental Pearl-oyster (*Meleagrina*) belongs to this family. The

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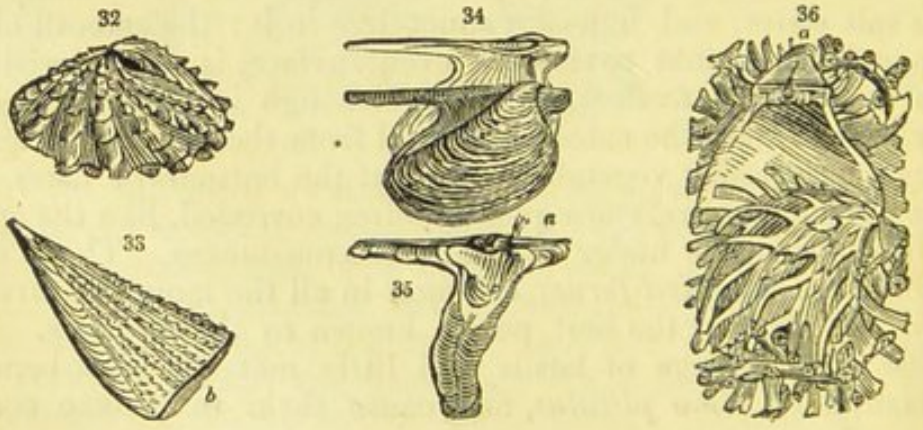

Scallops (*Pecten*, fig. 8), a highly ornamented group of shells, known by two small ears and generally radiated surface, and Thorny Oyster (*Spondylus*, fig. 36), with a very curious hinge (*a*) and large spines upon its surface, are of another family; the spines of the latter are attached, at the time of their growth, to rocks or coral, so as to fix the shell. This leads us to the

Oyster (*Ostrea*, fig. 9), that often fixes itself by the laminæ of the whole surface of one valve; and the Anomia (fig. 37), a pearly shell, common upon Oysters and stones, which has a hole in one valve, and through this a portion of the tendon passes; its extremity becoming shelly, and uniting to the Oyster-shell or rock, so as to fix the animal permanently. The *Placuna*, or Window-shell (fig. 38), is like two flat pieces of dull glass, with the fulcrum and hinge-ligament shaped like the letter V inside it. It is fished for its pearls in Ceylon.

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3. LAMP-SHELLS. (Brachiopoda.)

The last order of Bivalves we shall notice are the Terebratulæ (figs. 39 and 40). Both the animal and shell are very different from any we have before mentioned. Two long fringed arms are coiled up within the shell, and there is no distinct breathing organ or gill. There is a hole through the beak of one valve for the passage of a kind of compacted byssus (fig. 39, *a*), by which the shell is suspended from sub-marine rocks; and the hinge is formed of two sockets, with teeth that work in them, but without a ligament (fig. 40). The arms are supported by an internal skeleton in the form of a slender loop of shell.

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4. PTEROPODA.

The fourth class, Pteropoda, contains animals furnished with two opposite equal fins, disposed for swimming vertically (fig. 42, *a*), which they are constantly obliged to do, having no foot. Their mouth is armed with teeth, and furnished with rudimentary feelers (*tentacula*) or suckers, but they have no separate and distinct head. Their shells (*b*) are very thin and glassy, and formed of one piece, which is shaped like a sheath in *Cleodora*, and globular with three points in *Hyalea* (fig. 42). In *Creseis* the shell is as slender as a needle; in *Cymbulia* it is shaped like a slipper; and in *Cuvieria* it is like a little glass bottle. The *Limacina* and *Spirialis* have a spiral shell, which is reversed or left-handed. *Clio* and some other genera have no shell. The

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Pteropodes are found in vast shoals in the open sea, far away from land. The northern Clio and Limacina inhabit the polar sea, and are called "whale-food" by the Esquimaux. Many forms abound in the tropics, but in the British seas only *Spirialis* is found, or very rarely a *Hyalea*, brought by the Gulf Stream.

5. GASTEROPODA.

The fifth class, GASTEROPODA, is composed of animals furnished with a muscular disc or foot (fig. 41, *a*), extending along the under side of the body, by means of which they crawl, like the Snail and Slug (or Limax, fig. 41). Several of the families are unfurnished with shells; but most possess a shell large enough to hold the animal.

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For the purpose of explaining the terms used in describing the shells of this class, we shall consider them as of three principal kinds, viz., multivalve, limpet-shaped, and spiral. The only multivalve is the Chiton (fig. 43), whose shell is composed of eight segments, arranged in a line on the back of the animal; the first is, of course, that over the head (*a*), known by the mouth; it has neither tentacula nor eyes; the border of the shell (*b*) is squamose (scaly), or bare, or clothed with hairs or spines. The second kind are tent-shaped (fig. 44), and placed upon the back of the animal; the summit, which is sometimes a little curved, and generally directed backwards, is called the apex. In the genus *Fissurella*, called the "Keyhole Limpet," the apex is perforated (fig. 45) to permit of the escape of water from the branchiæ; *Emarginula* has a fissure in the edge of the shell for the same purpose; the branchiæ, or gills, in these genera, being placed in a peculiar cavity, not round the body under the mantle, as in the Limpet (Patella). The edge of the shell is called the base; within its hollow surface may generally be traced the marks where the muscle of the foot was attached; the head is placed where the impression of the muscle is discontinued; hence, the front, back, right, or left sides, may be known. Within the cavity of some Limpets is a septum (or partition), as in *Crepidula*; or a funnel, as in the "Cup and Saucer Limpet" (*Crucibulum*). The last kind are the spiral or convoluted shells; they are by far the most numerous; a common Snail is a good example (fig. 47, *a*). A spiral shell is a long

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tapering tube, regularly curled upon an axis, either really existing or to be imagined; when existing, the axis is called the columella; the smallest end of the tube is the apex, the other the aperture; the plane of the aperture is sometimes in the same direction as the axis; it is then longitudinal (fig. 46); at other times it is oblique (fig. 56), or transverse (fig. 49, p. 155). The aperture is considered as composed of two lips, the columellar or inner lip, and the outer lip, opposite to its edge; it is sometimes furnished with a peristome (or thick rim), and a notch or sinus, or a canal, often occurs at either the upper or lower junction of the lips (fig. 81, *a*), or at both places (fig. 88); a canal at the lower junction, or base, forms the beak. The several rings that compose the shell are called whirls; all excepting the last formed, taken together, constitute the spire; it is either more or less conical, or discoid, or internal; when internal, the shell is said to be convoluted (fig. 88); it is then formed of a flattened tube, rolled up like a roll of paper; when discoid, it resembles a French horn; and when conical or turreted it is more in the form of a screw. The line of union of the whirls is called the *suture*. The base of the shell is that part about the aperture which rests upon the animal as it crawls (fig. 47, *b*). The opposite part in some convoluted shells is the back. The length of the axis is the length of the shell; the largest diameter is the width; the outer lip generally indicates the front; a hollow in the centre of the shell is called the umbilicus, which is covered, in some full-grown shells, by the columellar lip; the columella sometimes has elevations upon it, called plaits. Univalve shells, like BIVALVES, are covered by an epidermis; in some, this is constructed of ciliated laminæ (or fringes), but it s generally smooth; the surface is ornamented with bands, carinæ (or sharp ridges,) following the curvature of the whirls, costæ (or ibs across the whirls,) knobs or tubercles, spines, &c., besides a great variety of colours. The shell is composed, as in BIVALVES, of a cellular tissue, hardened by the deposition of calcareous earth, rom the edges of the mantle of the animal, and is constructed at uccessive periods; the conclusion of each period is sometimes narked by a thick edge to the aperture, or a row of spines; this s called a varix. Some spiral UNIVALVES have a lid, or *operculum*, which is placed upon the back of the foot, and closes the aperture when the animal has retired into the shell; it is either horny (fig. 1, *b*) or shelly.

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Certain Bivalve shells, as we have before observed, corrode limestone rocks, and live in the holes so made; some of them deposit earthy matter within the holes they have made. The same powers are exerted by many UNIVALVES upon their own shells: thus, they eat away, as it were, a great part of the surface of such portions as would become internal, when they enlarge the size of the shell by additions to the edge of the aperture, for the purpose of preventing too great an increase of weight; and they also remove spines, which would obstruct the passage of the animal through the interior, were they to be left. The power that BIVALVES have of attaching their shells to other bodies by their own substance, is also possessed by a few, and only a few, UNIVALVES, which are called Carriers, from their cementing to their own shells other shells, or stones, or corals.

Having said thus much of the shells, it will be sufficient to add only a few words to what we have already remarked relative to the animals.

The mantle is a thick membrane that, more or less, envelopes the animal: in the Slug (fig. 41, *d*, p. 151), it is a shield-like appendage upon the back; in the Garden Snail it is of the same shape as the shell, and the animal's head and foot can be drawn into it. The organs of respiration are commonly under the mantle. In the common Slug and Snail, and many fresh-water shells, the opening of the mantle is so contracted as to form a round hole (*a*), and in some a tube (fig. 55, *a*, p. 155), to admit air; while in shells with a beak or notched aperture (fig. 81, *c*, p. 159), it is always in part formed into a tube, or a siphon, to conduct water, charged with air, to the branchiæ. The mantle is so large in some animals, as to be spread over more or less of the shell; others have internal shells.

We shall now proceed to give a few examples of the families and genera of GASTEROPODES, selecting only such as bear shells.

The GASTEROPODES are divided into two sections, distinguished by the organs of respiration; the one has branchiæ, or gills, and breathes through the medium of water, like fishes, and is entirely marine or fresh water; the other has respiratory organs, resembling lungs, and is chiefly terrestrial, though many air-breathing UNIVALVES inhabit fresh water, and some are found in the sea. Of the terrestrial air-breathers, some are furnished with an operculum, whilst in others the shell itself is rudimentary or wanting.

The water-breathing UNIVALVES are divided into two sections, distinguished by the form of the aperture of the shell. The first section contains shells with a round aperture, whose animals have a simple mantle. The common Periwinkle (*Litorina*, fig. 65), is a familiar example; the branchiæ are like a small comb, within the mantle. The shells of the second section have either a

notch at the base, or the same part enlarged, so as to form a straight or reflected canal, containing a tube (or *siphon*) formed of the mantle. Some of the shells of each section have an operculum; it is placed upon the back of the foot, and connected with a strong tendon that is attached to the columella. Many lesser divisions and families are formed under each section. We must content ourselves, at present, with a few observations upon some of the most striking genera. Several have been already noticed, viz., Chiton (fig. 43), composed of a series of valves upon the back of the animal. The Limpet, a simple hollow cone, with the apex directed upwards, is the simplest of all shells. Fissurella (fig. 45), like Patella, with a hole in place of the apex, and Bulla (fig. 46), a convoluted shell, the animal of which has a mantle formed of lobes, that can be spread over the shell.

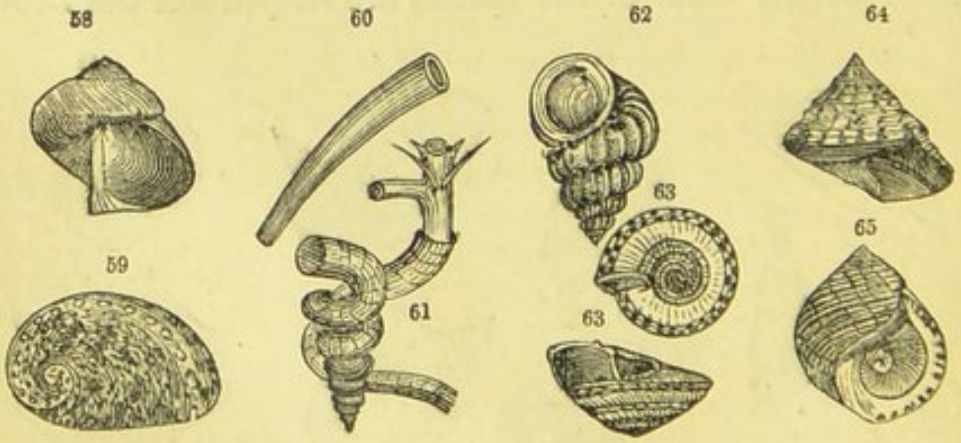
The Snail (*Helix*, fig. 47, p. 153), has a more or less globose or depressed shell; the eyes of the animal are placed at the ends of two long tentacles (or feelers); there are usually two other (oral) tentacles, which are shorter. The Lamp-snail (*Anastoma*) has a depressed spire, and the aperture remarkably turned up on the back of it, and lined with large tooth-like plaits (fig. 49). Clausilia (fig. 50) has a very long spire, widest in the middle; the whirls curl in a direction reverse to that of the Helix; and the columella has a valve attached to it by a linear shelly spring, that acts the part of an operculum (*a*). Testacella (fig. 48), is an animal like a Slug, with a small shell upon its tail. Achatina (fig. 51), is an oval shell; the base of the aperture is truncated, as if a piece had been cut off, so as to form a rounded sinus, or notch; some of the species are striped like the Zebra—

after which animal one is named (fig. 51); they are found in Africa, and are the largest land shells known. The operculated Land-snails (*Cyclostoma* and *Helicina*) are very numerous, and chiefly in-

habit the warm and moist islands of the West Indies and Asiatic seas. The animals are more like Periwinkles than Snails, having the eyes at the bases of the tentacles, and the mantle open. Auricula (fig. 52) is a genus found in brackish water, or the sea, in which the aperture is fancied to bear some resemblance to the ears of various quadrupeds, after which the species are named: as Felis, or Midæ (fig. 52), &c. The edge of the longitudinal aperture is thickened, and the columella plaited. Planorbis and Limnæa (figs. 53 and 54) are common fresh-water shells: the first is discoid; the second ovate and tender, with a large aperture and flattened spiral columella. They have each only two tentacula, with eyes at their base, and are obliged to come up to the surface of the water to breathe air.

Ampullaria (fig. 55) is a globose fresh-water shell, with a horny or shelly operculum; one of its species is the largest fresh-water shell known; it would hold above a pint. Nerita (fig. 56) is almost globose, with a flat, broad columella placed across the aperture, whose inner surface, near the edge, as well as the edge of the columella, is either thickened or toothed. Neritina (fig. 57) or fresh-water Nerite, greatly resembles Nerita; but the lip is not thickened nor toothed; it lives in fresh water only, while the Nerita requires salt water; they both have shelly opercula, and in both the animal dissolves the interior of the spire.

The Violet-snail (Ianthina, fig. 58), is a somewhat globose, very tender shell; remarkable for the pale violet, or blue colour spread over the base of the shell, whose inhabitant floats in a reversed po-



sition at the surface of the sea. Haliotis, or the Ear-shell (fig. 59), is a flat, very broad shell, composed of brilliant pearl; the aperture occupies half its surface; the spire is very small, and from it a row of holes extends to the front of the edge; it has no oper-

culum. Dentalium, or Tooth-shell (Fig. 60), is an attenuated conical tube, slightly bent, and open at both extremities; the animal has a thousand fine thread-like suckers, with which it collects minute shells in the mud of the deep sea; the name is taken from the resemblance of the shell to an elephant's tusk. Vermetus (fig. 61), so named from its resemblance to a worm, is a simple long tube, irregularly curled, except near its commencement, and fixed to rocks by its apex.

Scalaria, the Wentle-trap (fig 62), is a round tube, regularly curled into a conical spire, but without a columella; every time the shell is enlarged, the edge of the lip is reflected, or turned outwards; thus forming many rings, or ribs, upon each whorl. Solarium, or the Staircase-shell (fig. 63), is short, conical, and wide, with a sharp edge to the base, and a very large umbilicus in the centre of it, within which the whorls are seen diminishing to the apex; the operculum is spiral and horny. Trochus (fig. 64) is conical, with nearly a flat base, square aperture, and produced columella; it is a pearly shell, with a horny, many-whirled operculum. Turbo (fig. 65) is an ovate, conical, or nearly globose shell, with a round aperture; the operculum is thick, shelly, and variously sculptured. The Periwinkle belongs to this division; it it is not pearly, and the operculum has few whirls. Turritella, or Screw-shell (Fig. 66), is formed of a turreted, or very much elongated, pointed spire, with a nearly round aperture.

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The following genera belong to the second section: Cerithium (fig. 67) is a turreted shell, with an expanded outer lip and short beak. Pleurotoma (fig. 68) resembles *Conus* (91), but has a long spire and a deep slit in the upper edge of the outer lip, and a produced beak. Turbinellus (fig. 69) and Pyrula (fig. 70) are pear-shaped, with a short spire and long beak; the first has also plaits on the columella. Ranella (fig. 71), Murex (fig. 72), and Triton (fig. 73), have varices, and more or less elongated beaks: the varices

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are ornamented with scales, foliaceous (leafy), spinose (formed of spines), tuberculated (knobbed), or serrated (toothed like a saw).

Ranella has the varices so placed as to form two rows along the sides; that is, one is placed at every half turn of each whorl. Murex has at least three rows—often more; but in Triton there are only three varices to two whorls. To this genus belongs one of the largest spiral shells—*Triton variegatus*, the Conch, used as a trumpet on the coasts of the Mediterranean and in the Pacific Islands (fig. 73).

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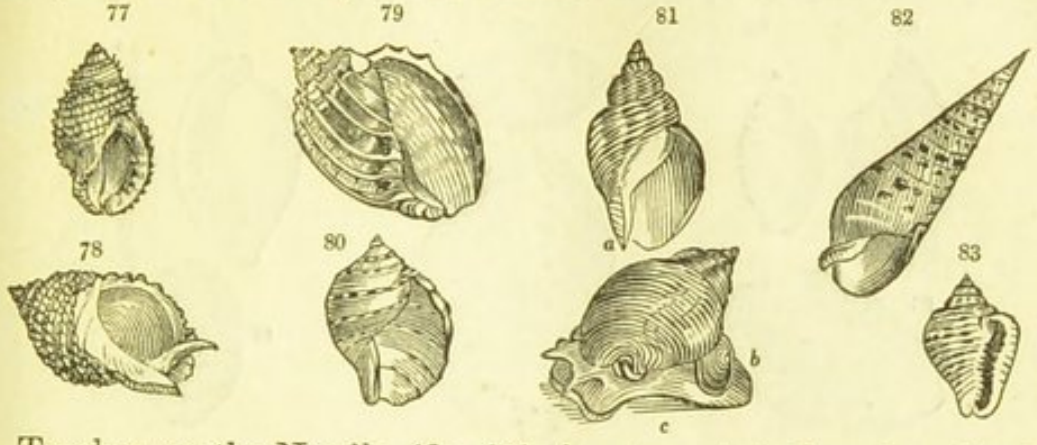
The Scorpion-shell (Pteroceras, fig. 74), when full grown, is supplied with large finger-shaped processes from the outer lip; the aperture is generally about as long as the shell, and narrow; one kind is called the Spider Stromb; it has the outer lip very thick, and a sinus in its margin, near the channeled, recurved beak. *Strombus gigas* (fig. 75) is the common Conch-shell, which is so much admired when the aperture is of a deep rose-colour. Cassis, or the Helmet (fig. 76), is a shell frequently used as a mantel-piece ornament; the spire is nearly flat, and the aperture as long as the shell, narrow, with both lips thickened, and toothed; the columellar lip covering the base, which is longitudinal with regard to the spire. Purpura (fig. 77) has a short canal and flattened columella; a small white species, *Purpura lapillus* (fig. 77), sometimes banded with yellow or brown, with a scaly surface, is common on the English coast. Monoceras (fig. 78) much resembles the last. It is found at Cape Horn, and is known by a long pointed tooth in the outer lip; whence its name, signifying Unicorn. Harpa, or the Harp-shell (fig. 79), is one of the most beautiful of shells; it is easily known by the smooth ribs, which resemble the strings of a harp; the columella is plaited. Dolium, or the Tun-shell (fig. 80), is a large, thin, globose shell, with a wide aperture, and toothed or crenated outer lip; it is sometimes large enough to hold a gallon. Buccinum, or the Whelk (fig. 81), is

elongated, with a very short canal, or rather only a sinus, at the base, and no varices upon the whorls.

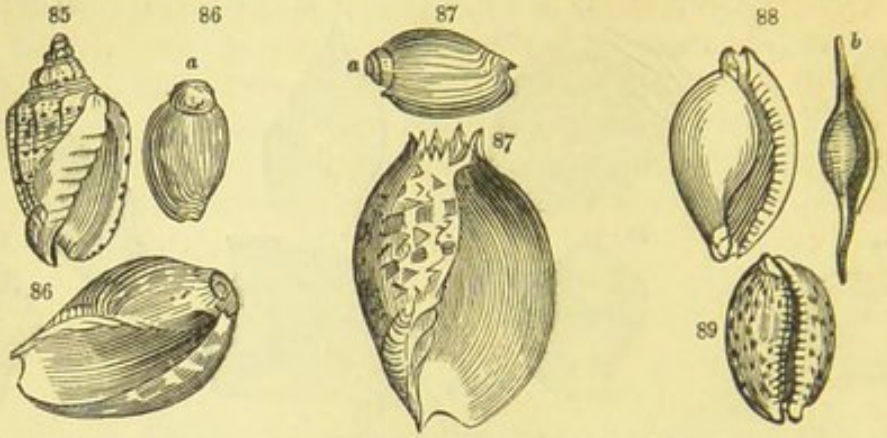


Terebra, or the Needle (fig. 82), is a turreted, sharply-pointed shell, with the columella curved, and a sinus at the base. Columbella (fig. 83) has a short spire, a long aperture, a plaited columella, and the middle of the outer lip thickened. *C. mercatoria* (fig. 83) is very common on the shores of the West Indies. Mitra (the Mitre, fig. 84) is a turreted or elongated shell, with the aperture elongated and columella plaited—the lower plaits smallest. Several species have a series of short spines round the upper edge of each whorl; these are said to be coronated (crowned, fig. 84, *a*); and different species are referred to different sorts of crowns. *M. papalis* (*a*) has coronated whirls; but *M. episcopalis*, the "Bishop's Mitre" (*b*), has the edge of the whirls entire. Voluta (fig. 85) has an ample oblong aperture, notched at the base, and plaits upon the columella; the spire is conical, sometimes coronated with large spines or tubercles. Some of the species are very rare and handsome. As the Harp-shell resembles a musical-instrument, so the *Voluta musica*, or Music-shell (fig. 85) presents us with notes set in score upon its surface. Cymba, the Boat (fig. 86), and Melo, the Melon (fig. 87), are two genera whose species are remarkable for the size of the aperture, and nearly concealed spire; the columella is strongly plaited in both. They differ in the form of the apex, or that part of the spire which was included in the egg, and is sometimes called the pullus; in Cymba, it is irregular (fig. 86, *a*); in Melo, it is a regular obtuse spire (fig. 87, *a*). Cymba is also a good example of an enamel-like glaze, that is deposited over the shells of such Molluscous animals as have large mantles.

84

Ovulum, or the Egg (fig. 88, *a*), is a convoluted shell with a narrow, longitudinal aperture, a very thin inner lip, and an invo-

lute (incurved), thickened outer lip, sometimes crenulated (see the figure), but always without teeth, and its extremities often



produced into long canals (fig. 88, *b*). Cypræa, the Cowrie (fig. 89), is a genus containing a considerable number of handsome polished shells; it differs from Ovulum in having many conspicuous teeth, or plaits, upon both the lips of the longitudinal aperture, the extremities of which are always truncated and turned up. When young, the shells of this genus have sharp lips without teeth, and an exposed spire; as they grow older, the outer lip is incurved, and becomes toothed, as does also the columellar lip. Whenever the animal finds it necessary to increase its shell, it begins by dissolving, or absorbing the outer coat, or glaze (being

covered by the mantle-lobes, they have no epidermis); it then forms a new whirl, concealing the part thinned; thus preserving a very light internal spire, and producing a case sufficiently strong for support. The mantle of the animal is formed of two lobes, that meet in a line upon the back of the shell. Oliva, or the Olive (fig. 90), is an oval shell, with a more or less produced spire; the aperture is longitudinal, with a sinus at its base, and a narrow canal continued from its upper angle, around the sutures of the whorls of the spire. Conus, the Cone (fig. 91), is the first genus

of shells in point of pecuniary value, and, certainly, very handsome. The form is a reversed cone, or something approaching it—the apex of the spire being the centre of the base of the cone; the apperture is narrow, with parallel sides, and a deep sinus at its upper part; the animal has a small horny operculum, and many species have a strong rough epidermis.

The last group of Univalves is organized for swimming at the surface of the sea, and the foot is converted into a fin, on which account they have been called "Heteropodes." It consists of two families; the Atlantas, which have a keeled discoidal shell, closed

by an operculum; and the Firolas, in which the shell is small or wanting. These last are elongated, and swim with their backs downward; the tail is the principal organ of locomotion; they are extremely active and rapacious. The Carinaria (fig. 92, *a*, *b*) has a transparent conical shell, with flattened sides; near the summit is formed a small discoid volution, containing the apex; the oblong aperture occupies the base. One species, *Carinaria vitrea* (*b*), is extremely rare; for which reason, joined to its beauty, and the important rank it holds in the system, it is of high price, and is but seldom offered for sale. A serrated keel rises up its front, and its sides are decorated with ribs parallel to the base.

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The species comprised in these genera are very numerous; many of them are beautiful; others are remarkable for their grotesque forms, or peculiar habits; and a few for their great size.

6. CEPHALOPODA.

The Cephalopodous Mollusca will next engage our attention: they have long arms arranged round a large head, with two great eyes, and a parrot-like beak, peeping out of a sac, or mantle; are divided into two sections; the first includes the pearly Nautilus, and numerous extinct genera, only found in a fossil state; the second contains various tribes of Cuttle-fish that have internal cartilages, or bones, but rarely shells. The shells of the first section are all chambered; that is, have a large portion of the interior divided into cells by septa. We shall confine our remarks to the recent Nautilus. The Nautilus (fig. 93) has a more or less ventricose, discoid shell; the whirls are internal, and there is no proper spire; for the apex is placed in the centre of the columella, or axis, around which the whirls curve, embracing each other in succession, and thus forming a disc, whose two sides are alike. The septa are perforated in their centres by a tube called the siphuncle, in part membranous, and in part shelly; the edges of the septa are entire, not sinuated or crisped, as in the fossil genus called Ammonites. The animal has nearly an hundred arms, or tentacles, surrounding the mouth, which is armed with a pair of hard, shelly mandibles and a spiny tongue; the eyes are large, and placed on short stalks. The

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creature has four gills, and is protected by a leathery shield, formed by the union of two of its arms, when it retires into its shell. It feeds on small crabs and shell-fish at the bottom of the sea. The second order of CEPHALOPODES contains the Cuttle-fish and Calamaries, which have ten arms, furnished with rows of suckers, or with horny claws; their mandibles also are horny; they have sessile eyes, and all their senses appear to be very acute; the gills are only two in number, and the shell is internal. They swim by means of their fins, which are placed at the sides or end of the body, and also by forcibly expelling the water from their respiratory cavity. When attacked, they have the power of clouding the water by an inky discharge. The bone of the Cuttle-fish was formerly used by apothecaries, and the ink as a pigment, like that which is still called *sepia*. The "pen" of the Calamaries is horn-like and flexible. The little *spirula* has a chambered shell, like the Nautilus (fig. 94); it is a regular discoid volute, whose whorls do not touch each other; the septa are concave on the side towards the aperture, and the siphuncle is placed close to the inner edge of the aperture; the septa are brilliant pearl, and the apex is surmounted with a globose pullus. The animal (fig. 94, *a*) is much larger than the shell, which is inclosed in the hinder part of the mantle; the chambers serve as air-vessels to keep the animal buoyant.

The Octopods, or Eight-armed Cuttle-fishes, have no shell, excepting the Argonauta, or Paper Sailor (fig. 95, *a*), the female of which has a thin, brittle shell, as a protection for its spawn, over which it broods; this shell is discoid, approaching to semi-circular; its sides similar; the margin flat, with a row of teeth on each edge of it; the aperture is very large, oblong, truncate at the front to correspond with the margin, and receiving, at its opposite end, or back, the involute apex. The animal is (fig. 95, *b*) a kind of Cuttle-fish with eight arms, of which two have broad membranous expansions at their ends. From very ancient times we have had lively descriptions of this little prototype of the ship Argo, dexterously spreading its sails, and plying its oars, or floating in tranquil enjoyment, upon the bosom of its native element, beneath a serene sky; and ready upon the approach of danger, to sink into the abysses of the sea. Unfortunately, this sailing takes place only in fable; the real Argonaut swims backwards, like a Cuttle-fish, or creeps at the bottom, like a snail.

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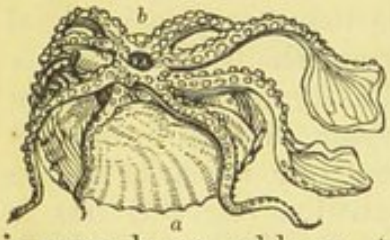


The *Argonauta Argo* is found in the Mediterranean; another species (*A. hians*), on the west coast of Africa; and a third, the "Rice Argonaut" (*A. oryza*), in the Indian ocean.

Shells verify, in a remarkable degree, the observation so generally made, while regarding the arrangement of animated Nature upon the surface of the globe; they are found to be more numerous, larger, brighter, and more variously coloured, formed of more parts, and bounded by less simple lines, in the vicinity of the tropics than near the poles, especially the north. Some genera are to be found in every climate; others only in the warmer regions. Thus we find one small species of *Cypræa* upon the British coast, while a multitude of larger species inhabit tropical seas. The Cyclades of the Thames and North-American lakes are small fragile shells, while the Cyrenas of China and India are large and heavy. The Watering-pot of Java, and Clavagella of Port Jackson, have nothing resembling them in colder climates; their forms are very remarkable. The greater number of species of the genera, Pholas, Solen, Mya, Astarte, and some other CONCHIFERA, are peculiar to cold climates. Pandora, Pinna, Spondylus, Chama, &c., are most numerous in temperate regions; the Spondyli and Chamæ of the Torrid Zone are, however, remarkable for their splendid colours. Trigonia is peculiar to Australia. Aspergillum, Anatina, Tridacna, and Placuna are only to be met with in the Indian Seas.

Among the UNIVALVES we may notice the genera of small shells, Clausilia and Limnæa, as being confined to temperate, or cold climates; and Hyalea, Anastoma, Achatina, Auricula, Ampullaria, Ianthina, Pteroceras, Cassis, Monoceras, Harpa, Dolium, Oliva, Conus, Argonauta, and Carinaria, among those that only live in the warmer latitudes. The Nautilus, also, with its chambered shell, is confined to the tropical seas, where the dead shells float in large flocks. Naturalists consider them to be pelagic shells, or living only in deep water. Most of the Volutæ belong to the southern hemisphere; they are found on the shores of the South-Sea Islands, and even at the Straits of Magellan. Many of the other genera have their species widely dispersed; the showy and large ones swarm in the neighbourhood of the tropics; among rocks and coral reefs; in the sea; in rivers and lakes; or in moist situations on land.

Amongst the land and fresh-water shells characteristic of the Old World, are—Nanina, Achatina, Clausilia, Achatinella, Pupa, Testacella, Limax, Pupina, Paludomus, Tanalia, Ætheria, Iridina, and Glaucomya. In the New World are found—Anastoma, Proserpina, Cylindrella, Chilinia, Mülleria, Castalia, and Gnathodon.

Among our British shells, the handsomest are *Pecten opercularis* (fig. 8), so commonly used for pincushions, &c., and *Pecten maximus*, or the Common Scallop; they may be reckoned an exception to the general rule, as they are among the largest and gayest of the genus. They abound on the southern shores. The

Ormer (*Haliotis*) attains its northern limit in our Channel Isles, and *Cytherea chione* on the coast of Devon.

As a further illustration of the situations in which shells may be found, we add a list of those we have figured, with their localities.

1. *Ascidium monachus*—British Coast.
2. *Clavellina lepadiformis*—Britain.
3. *Botryllus violaceus*—On sea-weed; Europe.
4. *Salpa maxima*; part of a chain—Pacific.

5 and 6. *Unio tumidus*—Rivers in Europe; as the New River.

7. *Venus Gallina*—Sea, England and Ireland.
8. *Pecten opercularis*—Distant from the shore, in Kent and Sussex; Ireland.
9. *Ostrea edulis*—Muddy banks, at the mouths of rivers.
10. *Mytilus edulis*—Stony shores, at the mouths of rivers.
11. *Mya truncata*—Sandy shores, on the coast of Kent.
12. *Venus striatula*—Sea, England and Ireland.
13. *Cyclas rivicola*—The Thames, above Westminster-bridge.
14. *Aspergillum Javanum*—Sand, on the coast of Java.
15. *Clavagella australis*—Sandy shore, at Port Jackson.
16. *Gastrochæna cuneiformis*—In corals, Isle of France.
17. *Teredo navalis*—In piles and drift-wood, Norway, Black Sea.
18. *Pholas Dactylus*—Chalk rocks, at Margate.
19. *Solen marginatus*—Sand, on the coast of Britain.
20. *Mya truncata*—Sand, on the English coast.
21. *Mactra Stultorum*—English coast.
22. *Corbula nucleus*—Deep water, European coasts.
23. *Pandora rostrata*—Coast of Normandy and Jersey.
24. *Petricola lamellosa*—Lime-stone rocks, in the Mediterranean.
25. *Tellina radiata*—Sea, round the West-Indian Islands.
26. *Venus striatula*—Sea, England and Ireland.
27. *Cardium edule*—Sandy shores of England.
28. *Arca Noæ*—Coral reefs in the Isle of France.
29. *Trigonia margaritacea*—Port Jackson, New South Wales.
30. *Chama Lazarus*—Coral rocks, in the West Indies.
31. *Ætheria tubifera*—Rivers Nile and Senegal.
32. *Tridacna Gigas*—Indian Ocean.
33. *Pinna pectinata*—Sandy ground, south coast of England.
34. *Avicula macroptera*—Rocks in the South Sea.
35. *Malleus vulgaris*—Rocks, in the Indian Ocean.
36. *Spondylus Gædaropus*—Among corals, in the Mediterranean.
37. *Anomia Ephippium*—Upon Oysters.
38. *Placuna Placenta*—Coast of Ceylon.
39. *Terebratula vitrea*—Hanging to rocks and corals, in the Mediterranean.
40. *Terebratula dorsata*—Straits of Magellan.
41. *Hyalea tridentata*—Atlantic Ocean.
42. *Chiton squamosus*—Rocks, in the West Indies.
43. *Acmæa testudinalis*—Rocks, on the coast of Britain.
44. *Fissurella Græca*—Rocks, on the coast of Europe.
45. *Bulla Ampulla*—Among sea-weeds, India.

46*a*. *Helix aspersa*—Gardens, in England.

46*b*. *Helix Porto-Sanctana*—Porto Santo, Madeira.

47. *Testacella Maugei*—Teneriffe: feeds on earth-worms.
48. *Limax cinereus*—Fields and gardens, in England.
49. *Anastoma ringens*—Woods, in Brazil.
50. *Clausilia Macarana*—Woods, in Hungary.
51. *Achatina Zebra*—Land, in Africa.
52. *Auricula Midæ*—Brackish water, Molucca Islands.
53. *Limnæa peregra*—Ponds and ditches, in England.
54. *Limnæa stagnalis*—Ponds, in England.

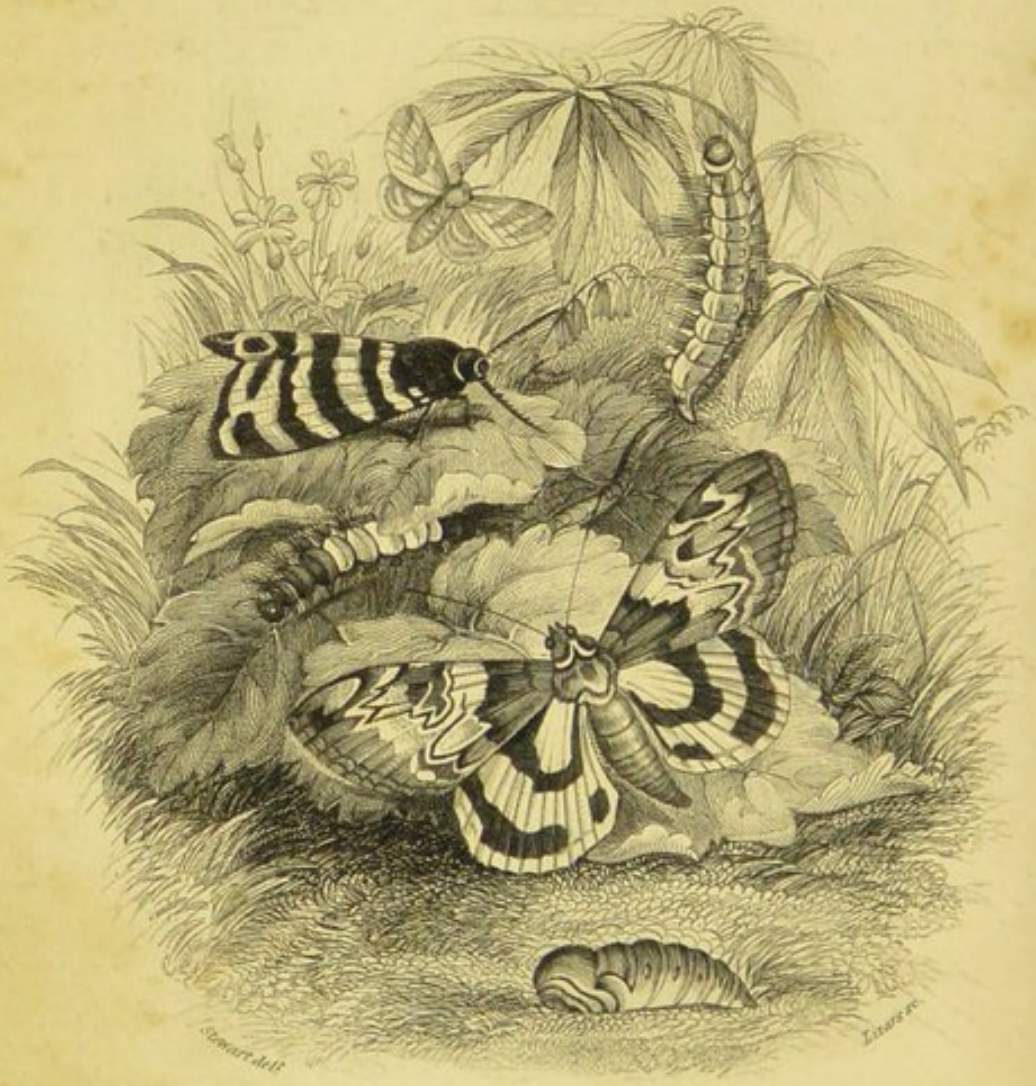
55. *Ampullaria effusa*—Rivers of South America.
55*a*. *Ampullaria dubia*—Rivers of South America.
56. *Nerita peloronta*—Sea-shore, in the West Indian Islands.
57. *Neritina strigilata*—Rivers of South America.
58. *Ianthina fragilis*—Floating in the Atlantic.
59. *Haliotis tuberculata*—Guernsey, upon sub-marine rocks. The animal is used for food, and the shells to ornament the outsides of houses.
60. *Dentalium entale*—England.
61. *Vermetus lumbricalis*—Among corals, Senegal.
62. *Scalaria pretiosa*—Seas, about China.
63. *Solarium perspectivum*—Indian Seas.
64. *Trochus zizyphinus*—Sea-shore, Kent.
65. *Litorina litorea*—Sea-shore, England.
66. *Turritella communis*—Southern shores, England.
67. *Cerithium asperum*—Among sea-weeds, Mauritius.
68. *Pleurotoma Babylonia*—Sea, among the Molucca Isles.
69. *Turbinella Pyrum*—Shores of the Indian Seas.
70. *Pyrula reticulata*—Shores of the Molucca Isles.
71. *Ranella crumena*—Indian Seas.
72. *Murex ramosus*—South Seas.
73. *Triton variegatus*—South Seas.
74. *Pteroceras chiragra*—Indian Seas.
75. *Strombus Gigas*—Shores of the West Indian Islands.
76. *Cassis flammea*—Indian Ocean.
77. *Purpura Lapillus*—Rocks, upon the shores of England.
78. *Monoceras imbricatum*—Straits of Magellan.
79. *Harpa ventricosa*—Seas of China.
80. *Dolium maculatum*—Indian Ocean.
81. *Buccinum undatum*—Round the English coast.
82. *Terebra maculata*—South Seas.
83. *Columbella Mercatoria*—West Indies.
84*a*. *Mitra Papalis*—Indian Ocean.
84*b*. *Mitra Episcopalis*—Indian Ocean.
85. *Voluta Musica*—Shores of the West-Indian Islands.
86. *Cymba Cymbium*—Western shores of Africa. The animal is eaten by the negroes.
87. *Melo umbilicatus*—Persian Gulf.
88*a*. *Ovulum Ovum*—South Seas.
88*b*. *Ovulum Volva*—Caribbee Islands.
89. *Cypræa Mappa*—Indian Ocean.
90. *Oliva ispidula*—Indian Ocean.
91. *Conus fuscatus*—Philippines.
92*a*. *Carinaria fragilis*—Atlantic Ocean.
92*b*. *Carinaria vitrea*—South Seas.
93. *Nautilus Pompilius*—Floating in the Indio-Pacific, between the Tropics.
94. *Spirula Peronii*—Atlantic.
95. *Argonauta Argo*—Mediterranean Sea.

To procure some shells in their native situations is by no means difficult: they may be picked up in hedges and on banks; drawn out of ponds and rivers, along with weeds; collected on the sea-shore, or among rocks; or they may be found among the refuse in fishermen's nets. To obtain an extensive collection in this way would, however, require much time and travelling, or the kind aid of many friends; enough, however, to illustrate the classes, orders, and many of the families, may be thus easily assembled, and afford much practical instruction. We recommend such a commencement before recourse be had to the more usual mode of obtaining a collection; namely, that of purchase. If the latter

means be resorted to, the buyer should be satisfied that each shell is perfect and full grown, and, if only one of the kind be selected, well-coloured, and as much in its natural state as a freedom from foreign matters will permit: all degrees of artificial polish or form should be considered as blemishes, except in articles of ornament. The size should be suited, as near as possible, to that of the purchaser's cabinet. It will be found of advantage to the student, to endeavour to fill up her series of families or genera, before she is anxious about particular species; unless she would confine her collection to some one tribe, which, after she has obtained a little general information, is a common practice. A collection is best kept in small trays, in shallow drawers of equal depth; and such specimens as are too large for the drawers, will form a handsome article of furniture arranged in a glass case. Our reason for recommending drawers of an equal depth is, that a systematic arrangement may be followed, which would add greatly to the value of any collection, and would be entirely destroyed by having regard to every variation of size. No other care will be requisite than to exclude the dust, or occasionally wash the specimens with soap and water.

However difficult Conchology may appear on the first glance at its scientific detail, we beg to assure our fair readers, that if they will employ a very brief portion of their time in its study, they will find it to be one of the most engaging branches of natural history. Many fleeting gratifications are daily purchased at an immense cost; while a small occasional expenditure will obtain an interesting series of shells, from which innocent and increasing pleasures may be derived for years.

ENTOMOLOGY.



ENTOMOLOGY.

Turn on the prudent Ant thy heedless eyes;
Observe her labours, sluggard, and be wise.

UNIVERSALLY distributed, or, at least, more so than any other part of the animal kingdom, insects are by far the most numerous of all its productions. They are found in the smallest islands, and in tropical climes abound to an astonishing degree; in the colder regions they are less numerous. There is no branch of natural history more within the reach of our readers, than the study and investigation of these "little wonders." This department of science is called Entomology, a term derived from two Greek words, signifying an insect and a discourse. Insects are so called, because they are divided into numerous segments, and not, as is generally supposed, from their being separated into two parts, which are merely attached to each other by a slender thread. They are further distinguished from other animals by being invariably furnished with six feet, and a head distinct from their body; and also by breathing through pores situated on each side of most of the segments, and leading into a system of delicate-branched tubes, called tracheæ, which conduct the air to all parts of the body. The head is furnished with a pair of jointed horns, called antennæ, which vary in the different families, and frequently afford important characters. The changes through which the greater number of insects pass, are from the egg to the larva or caterpillar; from the

larva to the pupa, or chrysalis; and from the pupa to the imago, or perfect state. There are, however, exceptions, some insects undergoing no metamorphosis; but the number of these is small.

PARTS OF INSECTS.

An insect may be divided into three primary parts, or sections, namely, the head, the trunk, and the abdomen.

The head is the anterior section of the body, and is distinguishable in most insects in all stages; it contains the mouth, and bears organs of sensation. (Fig. 1 represents the head of the common Cockchafer.)

The trunk, or thorax, fig. 2, is the intermediate, or second section of the body; it bears the organs of motion.

The abdomen, fig. 3, is the last, or posterior section of the body, and contains the organs of digestion, &c.

1 2 3

Having thus detailed the three primary sections of an insect, it will be necessary to enumerate such parts of their organization as will enable the reader to proceed in their investigation, unincumbered with technical phrases, at least abridged as far as the subject will allow.

The head of insects bears the organs of the mouth, and almost the only organs of special sense—the eyes and antennæ—which have been detected in this class of animals.

With respect to the mouth, insects have been divided into two great sections, or sub-classes: the one, named MANDIBULATA, being furnished with mandibles and maxillæ, or perfect mouth, as in Beetles, &c. (fig. 14, page 170), by which they separate and masticate their food; the other, HAUSTELLATA, or those which take their food by suction—having the parts of the mouth so modified as to adapt them for imbibing the juices of animals and plants.

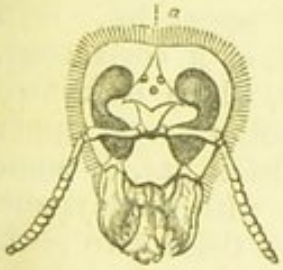
The eyes of insects, in general, are of two kinds, simple or compound. The latter have the appearance of two immoveable caps, often composing the greatest part of the head, and containing

4

an infinite number of little hexagonal facets, more or less convex, and placed with the utmost regularity and exactness, in lines crossing each other, and resembling net-work (see fig. 4, which is a small portion of an eye highly magnified). The number of lenses in an eye vary in different insects. Hooke computed those in the eye of the Tabanus, or Horse-fly, to amount to nearly 7000; Leeuwenhoeck found in that of the Libellula, or Dragon-fly, 12,544; 17,325 have been counted in that of a Butterfly, and no less than 25,000 in that of a small Beetle: the pictures of objects painted thereon must be millions of times less than the images of them pictured on the human eye.

Besides the larger eyes which we have above described, many insects have two or three small hemispherical bodies, placed on the crown of the head; these are called stemmata or ocelli (fig. 5, *a*). They are simple, and made for viewing large and distant objects; the other eyes, for small and near ones. Leeuwenhoeck looked through the eye of a Dragon-fly—with the help of a microscope—as a telescope, and viewed the steeple of a church, which was 299 feet high, and 750 feet distant: he could plainly see the steeple, though not apparently larger than the point of a fine needle. He also viewed a house; and could discern the front, distinguish the doors and windows, and perceive whether they were open or shut.

5



The antennæ are two articulated moveable processes, placed on the head; they are subject to great variety, and their differences of structure afford valuable characters in the classification of insects. The principal modifications may be understood from the following definitions, which are subject to a further variety of forms, in respect to the comparative length of the joints, their attachment, termination, &c. The principal forms are as follow:

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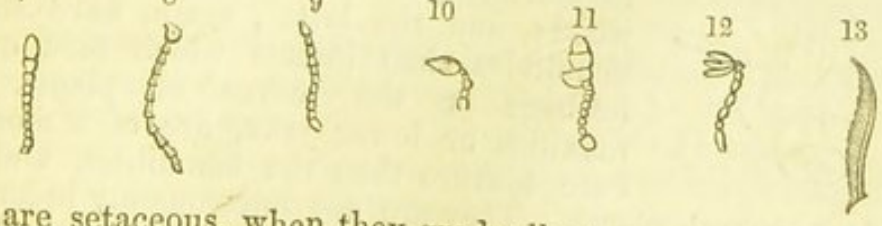
7 8 9 10 11 12 13



They are setaceous, when they gradually taper towards their extremity (fig. 6); clavate, when they grow gradually thicker from their base (fig. 7); filiform, when of an equal thickness throughout the

whole of their length (fig. 8); moniliform, when formed of a series of knots resembling a string of beads (fig. 9); capitate, when they terminate in a knob (fig. 10); fissile, when the knob is divided, longitudinally, into laminæ, or plates (fig. 11); perfoliate, having the knob divided horizontally (fig. 12); pectinate, having a longitudinal series of hairs, or processes, projecting from them in the form of a comb (fig. 13).

Authors do not seem to agree as to the use of the antennæ; by some they have been regarded as organs of hearing, by others as organs of smell; in many insects they are certainly subservient to the sense of touch, but their true function in the class generally is still involved in obscurity.

The mouth of insects of the first sub-class, MANDIBULATA, is perfect, being furnished with mandibles, &c. (fig. 14). There are six principal parts of the mouth in this section. The labrum, or upper lip, is a transverse, moveable piece, of a coriaceous, or membranaceous nature, which is known from its situation at the anterior or upper part of the mouth. Fabricius has, in some instances, confounded this with the clypeus, or shield of the head; but these two parts may be distinguished by one invariable character: the clypeus is fixed, and forms a portion of the head; the upper lip is moveable, and is placed more forward (fig. 14, *h*). The labium, or lower lip, the piece which terminates the mouth beneath, is subject to a variety of forms: it is often bifid (cleft or divided), and has the posterior pair of feelers placed at the base (fig. 15, *a*, the labial palpi; *e*, the labium). The mandibles, or upper jaws, are two hard pieces, placed one on each side of the mouth, below the upper lip. These have a lateral, or side motion, while the upper and lower lip move up and down, as in other animals (fig. 14, *d*). They differ from the maxillæ, by not having any palpi, or feelers, attached to them. In rapacious insects they are longer than in those which perforate wood; and the latter, again, have stronger mandibles than insects which feed only on herbage or the leaves of plants. The maxillæ, or lower jaws, are of a more delicate texture than the mandibles, and composed of several pieces. They are not uncommonly indented at the extremity, and nearly all ciliated at the inner edge (as at fig. 16, *a*). They are placed under the mandibles, and above the lower lip; their motion is lateral, and they are gene-

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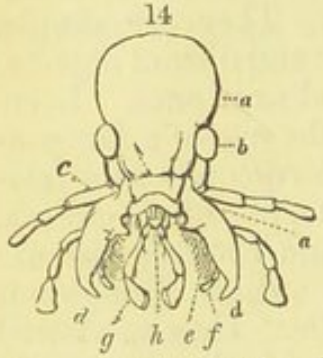

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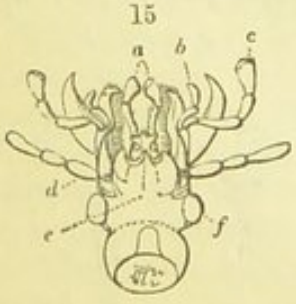


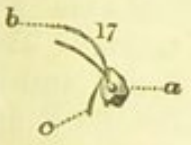
rally furnished with palpi (fig. 6, *b*, *c*). The palpi, or feelers, are small, moveable, jointed appendages, attached to the maxillæ and labium. In some instances they resemble the antennæ. Their most usual number is four, but some few families of insects are furnished with six; they are termed labial (fig. 15, *a*) and maxillary (fig. 16, *b*, *c*), according as they are attached to the labium or the maxillæ.

16

The foregoing are the principal parts of the mouth, the modifications of which are admirably adapted to the manners and food of insects. It must be remembered, that the above characters properly belong to the MANDIBULATA. We shall now describe those of the second sub-class:—HAUSTELLATA, or Sucking Insects.

The promuscis, or rostrum, of Linnæus and other authors, is the part which forms the mouth in the Hemipterous insects. This instrument is moveable, articulated, and bent under the breast. It is formed of the produced labium. It is hollow within, and contains, as in a sheath, four very fine and delicate pieces, analogous to the mandibles and maxillæ. These unite and form a suctorial tube, which is introduced into the body of the animal, or substance of the plant, from which the insect draws nourishment (fig. 17, *a*, head of Pentatoma; *b*, antennæ; *c*, rostrum). The labrum, or upper lip, in these insects, forms a long slender piece, which closes the basal joints of the rostrum in front.

17



Proboscis is a term employed by Linnæus, and still retained by entomologists, to designate the sheath that contains the sucking organs of the Dipterous insects, in many of which the proboscis is terminated by two soft fleshy pieces, forming lips (fig. 18, head of *Eristalis tenax*; *a*, antennæ; *b*, nasus (nose); *c*, proboscis). The proboscis is also formed by the lower lip, and contains within its cavity a variable number of bristles or lancets, representing the other parts of the mouth of biting insects. The bristles representing the maxillæ, usually bear their palpi; and when these bristles are wanting, which is sometimes the case, the palpi grow out from the base of the proboscis.

18

The sucker, or spiral tongue, is an involuted tubular organ, which constitutes the principal part of the mouth in Lepidopterous insects. This part is generally filiform, and is of moderate length, as in most of the Papilionidæ; or long, as in most of the Sphingidæ: in the Arctiadæ, and in some other families of this order, it is apparently wanting, or much shorter than in the others. In a state of rest this part is rolled up, spirally, between the palpi. It consists of two filamentous pieces, formed by the prolonged maxillæ,

which are externally convex, concave within, and connected longitudinally by a suture along the middle, above, and beneath. These, in uniting, form a cylinder, through which the nectar of flowers, on which the insects subsist, is drawn up with facility. These two pieces are easily separated by a needle (fig. 19, *a*, the antennæ; *b*, palpi; *c*, the tongue).

19

The trunk, or thorax, is the second principal division of an insect. This portion is situated between the head and the abdomen, and is resolvable into three segments, called respectively the prothorax, mesothorax, and metathorax. In many insects these three segments are distinctly separated, and capable of more or less motion; but in others they are united together, so that the different pieces composing the thorax are only distinguishable by the sutures which mark their lines of union. The prothorax is the most anterior of the three, and in those insects which have the segments of the thorax distinct it appears, from above, as a sort of broad shield behind the head (fig. 20, *f*). It has usually a cavity in front for the reception of the hinder part of the head, and two cavities beneath for the insertion of the first pair of legs (fig. 21, *a*). The second and third segments (mesothorax and metathorax) bear the two hinder pairs of legs on their lower surface, and on their upper or dorsal surface the two pairs of wings. The centre of the lower surface, between the bases of the legs, is called the sternum (or breast-bone), and is sometimes very prominent. The centre of the upper surface of the mesothorax often forms a peculiar plate or tubercle, called the scutellum (fig. 20, *a*), which is generally of a heart-shaped or triangular figure; in the numerous insects (Beetles, &c.) in which the back of the abdomen is concealed beneath the wings, this is the only part of the mesothorax visible from above, and in some of these it attains so great a size as to conceal beneath it the whole back of the abdomen and the wings.

20

21

The elytra, or wing-cases, which occur in a great number of insects, are the anterior wings considerably thickened and converted into horny or leathery organs. They are generally moveable; and, in the COLEOPTERA, or Beetles, open by a longitudinal suture along the middle of the back. In some few of this order the elytra are united; the upper surface is more or less

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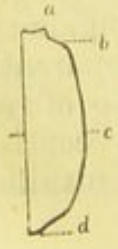


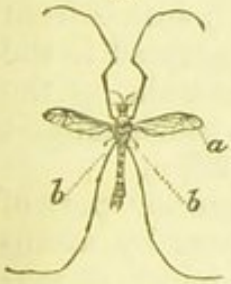
convex, and the lower surface correspondingly concave. The texture in several of the Curculionidæ is so hard, that they are pierced with difficulty; in others, as in Meloë, they are flexible. The difference in form, and the diversity of their surface, afford both generic and specific characters. The elytron is fully illustrated by the diagram (fig. 22, elytron of a Beetle; *a*, base; *b*, shoulder; *c*, lateral margin; *d*, apex; *e*, the longitudinal suture).

23

The wings are the organs of flight. These are either two or four in number, usually membranous in texture, and traversed by veins or nerves; the anterior wings are rarely of the same size with the posterior, and more frequently larger than smaller (fig. 23, *a*, the wings separated; *b*, joined, as in flight).

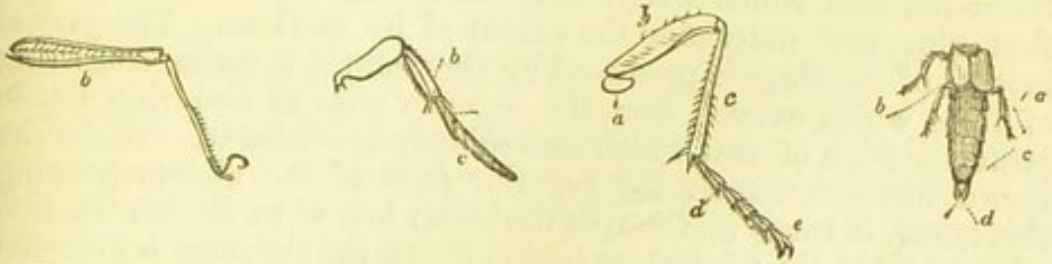
Halteres, or poisers, are two short, moveable, clavate filaments, placed one contiguous to the origin of each wing. They seldom exceed one tenth of the length of the wing, though in a few genera they are longer. The head, in which the filament terminates, is subject to a little variation; in some insects it is placed under a small, arched, filmy scale, but in several families this is wanting. This organ is peculiar to the Dipterous order of insects (fig. 24, *a*, wing; *b*, *b*, halteres).

24



The legs, in all insects, amount to six, and never exceed that number; and the same is observable of the true feet in the larvæ of insects; the latter have spurious feet to a greater amount, but the true feet do not exceed six. From the different conformations of the legs, it is easy to recognise, even in the dead insect, the mode of life which the species is destined by Nature to pursue.

25 26 27 28



The legs of insects adapted for running or walking are long and cylindrical; the thighs of the leapers are remarkably large and thick, with the shank long, and frequently arched, by which means they possess great strength and power for leaping; as in Grasshoppers (fig. 25). In those accustomed to dig in the earth the legs are broad, serrated (or toothed like a saw), and sharp at the

edges; and such as inhabit the water have the legs, especially the posterior pair, long, flat, and ciliated, or fringed at the edge with hair (fig. 26, hind, or posterior leg, of Dyticus). The leg of an insect consists of the following parts: the coxa, by which the leg is articulated to the body; the trochanter (fig. 27, *a*); the femur, or thigh (*b*); the tibia, or shank (*c*); and the tarsus, or foot (*d*), which is terminated by the claws (*e*). The trochanter is a small joint which articulates with the coxa, and unites this with the thigh. The nature and extent of the motions of the thigh appear to determine its form. Those which require strong muscles adapted for leaping, have the thigh not only thick, but generally elongated, as in Grasshoppers (fig. 25, *b*). The tibia, or shank, is the third joint of the leg, and moves in an angle, according to the direction of the thigh. The figure of this part depends essentially on the uses to which the habits of the insect require it to be applied. The tarsus (fig. 27, *d*), or foot, is the fourth joint of the leg; it varies in form, and the number of its joints is from one to five. The figure of the tarsi is admirably adapted to the insect's mode of life. The articulations in such as walk on the surface of the earth, are slender; many of those which inhabit waters have them flat and ciliated at the edges (fig. 26, *c*).

The abdomen, or third principal division, or posterior part of the body, is connected with the breast, either closely or by means of a filament. The abdomen is composed of annular joints, or segments, the number of which varies in different insects. The total movement of the abdomen is not very obvious, except in the Staphylinidæ (fig. 28), Forficula, and the pedunculated body of the Hymenoptera. It has then a real joint, in which the first annulation is indented above, and receives a projecting process from the breast, on which it moves. The joint is rendered secure by elastic ligaments, which have a considerable degree of force. Some muscles, which arise within the breast, are inserted into the first ring, and determine the extent of its motions. The partial motion of the rings is produced by very simple muscles, consisting of fibres which extend from the anterior edge of one ring to the posterior edge of that which immediately precedes it. When the dorsal fibres contract, the superior part of the abdomen being shortened, it turns up towards the back; but when the contraction takes place in the ventral, or lateral fibres, the abdomen is inflected towards the belly, or directed to one of the sides. The extent of the motion, however, depends on the number of the rings and their mode of junction. In the Coleoptera, for example, the rings only touch each other by their edges, and the motion is very limited (fig. 28); but in the Hymenoptera, they are so many small hoops, which are encased, one within the other, like the tubes

of a telescope; so that scarcely half, and sometimes not above one third, of their extent appears externally. This is attempted to be shown by the irregularity of the darker markings in fig. 29, *a*. The abdomen contains the intestines, the ovary, and part of the organs of respiration; it is affixed to the thorax; and, in most insects, distinct from it, forming the posterior part of the body.

29

An appendage of any kind, terminating the abdomen, is usually denominated the tail. This appendage varies in figure, considerably, in different insects, and many tribes are totally destitute of it. It is supposed to be destined to direct the motions of the insect in flight, to serve for its defence, and for the deposition of its eggs. In some insects the tail is simple, and yet capable of being extended and withdrawn at pleasure. Some have two or three bristle-shaped appendices, as in Ephemera. In some it is forked, as in Podura. When it terminates in a pair of forceps, as in the Earwig, it is called forcipate. In the last segment but one of the tail of Staphylinus, there exist two soft fleshy organs, which secrete an offensive fluid (fig. 28 *d d*); this appendage is termed papilliferous. In the Panorpa the tail is furnished with a claw (fig. 30).

30

The ovipositor, which presents itself in various forms in different families of insects, is another appendage to the abdomen; it is peculiar to the females. It is employed in piercing the tissues of plants or animals in order to deposit the eggs in a suitable situation, and is sometimes serrated or barbed, sometimes smooth and pointed. Frequently the ovipositor is retractile within the body, whilst in other cases it projects more or less from the apex of the abdomen; in many insects, such as the Bees and Wasps, it is connected with poison glands, and converted into a sting, which is freely used as an offensive weapon.

METAMORPHOSES OF INSECTS.

Were a naturalist, says Mr. Kirby, to announce to the world the discovery of an animal, which, for the first five years of its life, existed in the form of a serpent; which then, penetrating into the earth, and weaving a shroud of pure silk of the finest texture, contracted itself within this covering, into a body without external mouth or limbs, and resembling, more than anything else, an Egyptian mummy; and which, lastly, after remaining in this state, without food and without motion, for three years longer, should, at the end of that period, burst its silken cerements,—struggle through its earthly covering, and start into day a winged bird;—

What, think you, would be the sensation excited by the strange piece of intelligence?—After the first doubts of its truth were dispelled, what astonishment would succeed! Amongst the learned, what surmises!—what investigations! Amongst the vulgar, what eager curiosity and amazement! All would be interested in the history of such an unheard-of phenomenon; even the most torpid would flock to the sight of such a prodigy. But, you ask, "To what do all these improbable suppositions tend?" Simply to rouse your attention to the metamorphoses of this insect world,—almost as strange and surprising,—to which I am now about to direct your view;—miracles which, though scarcely surpassed in singularity by all that poets have feigned, and though actually wrought every day beneath our eyes,—are, because of their commonness and the minuteness of the objects, unheeded alike by the ignorant and the learned. That Butterfly,—which amuses you with its aërial excursions, while extracting nectar from the tube of the honeysuckle,—and then, the very image of fickleness,—flying to a rose, as if to contrast the hue of its wings with that of the flower on which it reposes,—did not come into the world as you now behold it. At its first exclusion from the egg, and for some months of its existence afterwards, it was a worm-like Caterpillar, crawling upon sixteen short legs, greedily devouring leaves, with two jaws, and seeing by means of twelve eyes so minute as to be nearly imperceptible without the aid of a microscope. You now view it furnished with wings capable of rapid and extensive flights. Of its sixteen feet, ten have disappeared, and the remaining six are, in most respects, wholly unlike those to which they have succeeded. Its jaws have vanished, and are replaced by a curled-up proboscis, suited only for sipping liquid sweets. The form of its head is entirely changed: two long horns project from its upper surface; and, instead of twelve invisible eyes, you behold two, very large, and composed of at least twenty thousand convex lenses, each supposed to be a distinct and effective eye!

The egg, containing the insect in the smallest size, is round, oval, conical, or cylindrical. The shells of some eggs are hard and smooth: those of others are soft and flexible. They vary considerably in colour; some being almost every shade of yellow, green, and brown; a few, red; and others, black. Green and greenish eggs are not unusual; and there are some speckled with darker colours, like those of birds. Many are smooth and highly polished; others, fluted; and some few are beset, in a pleasing manner, with raised dots.

Insects are instructed by Nature to deposit their eggs in situations where their young ones will find the nourishment most

convenient for them. Some deposit their eggs in the oak-leaf,—producing there the red-gall; others choose the leaf of the poplar, which swells into a red bladder; and to a similar cause may be assigned the knob which is often seen on the leaf of the willow. The *Lasiocampa neustria* glues its eggs, with great symmetry, in rings, round the smaller twigs of trees: each of these bracelets, as the French gardeners aptly call them, is composed of from two to three hundred pyramidal eggs with flattened tops, having their axis perpendicular to the circumference of the twig to which they are fastened, surrounding it in a series of from fifteen to seventeen close spiral circles, and having their interstices filled up with a tenacious brown gum, which, while it secures them alike from the wintry blast and the attack of voracious insects, serves as a foil to the white enamel of the eggs that it encompasses. It is not easy to conceive how these Moths contrive to accomplish so accurately, with their tail and hind feet, an arrangement which would require the most delicate care from the hands of an artist. Reaumur bred numbers of the insects from the egg, and supplied the females with appropriate twigs; but the Moths, as though resolved that imprisonment should not force from them the secret of their art, laid their eggs at random, and made no attempt to place them symmetrically.

All Caterpillars are hatched from the egg; and when they first proceed from it, are small and feeble, but acquire strength as they increase in size. The body of the Caterpillar consists of thirteen rings: of these the head is the first, and is hard and crustaceous. No Caterpillar of a Moth or Butterfly has less than eight, or more than sixteen true and other feet; those which have more than sixteen belong to some other order of insects. The Caterpillar, whose life is a continued succession of changes, before it attains its full growth, often moults, not merely the skin, but the jaws, and all the exterior parts, both scaly and membranaceous. The change is effected by the creature's withdrawing itself from the outer skin, as from a sheath, when it finds itself incommoded from being confined within too narrow a compass; but to accomplish this, is the work of some labour and time. Those Caterpillars which live in society, and have a nest or habitation, retire there to change their skins, fixing the hooks of their feet, during the operation, firmly in the web of their nest. Some of the solitary species spin, at this time, a slender web, to which they affix themselves. A day or two before the critical moment approaches, the insect ceases to eat, and loses its usual activity. In proportion as the time of its change approaches, the colour of the Caterpillar declines in vigour, the skin hardens, becomes withered, and is soon incapable of receiving those circulating juices by which it was be-

fore nourished and supported. The insect is seen at intervals with its back elevated, or with the body stretched to the utmost extent; sometimes raising its head, moving it from one side to another, and then letting it fall again. As the change approaches, the second and third rings are considerably swollen. By great internal efforts the old parts are stretched and distended as much as possible; this operation is attended with difficulty, as the new parts are all weak and tender; but by repeated exertions, a slit is made on the back, generally beginning at the second or third ring. The new skin may now be just distinguished, on account of its freshness and brightness of colour. The Caterpillar then presses the body, like a wedge, through this opening; by which means it is soon torn down from the first to the fourth ring, which renders it large enough for the Caterpillar to pass through.

The Caterpillar generally fasts a whole day after each moulting; for it is necessary that the parts should acquire a certain degree of consistency before its organs can perform their ordinary functions. Many perish under this operation. The Caterpillar always appears much larger after it has quitted the exuviæ than before, the body growing under the old skin till it becomes too large for its case, and the parts, which are soft, being much compressed; but as soon as the old skin is quitted, the parts distend, and with them the new skin, which is yet of a flexible and tender texture, so that the increase in the size of the Caterpillar, at each moulting, is very considerable. Some Caterpillars, in changing their skin, alter very much in colour and appearance; sometimes the skin, from being smooth, becomes covered with hair, spines, or tubercles; others, that are in one stage hairy, have the skin smooth in the next.

By the pupa state, in the very extensive sense Linnæus proposes, is signified that state of an insect which succeeds the larva, without any regard to the particular appearance it assumes in this period of transformation. From so great a latitude of meaning it includes, therefore, with equal precision, and no less propriety, states of the most discordant character. It alike implies the uncouth grub, incased in its shelly repository, and immured in the earth, sluggish and almost destitute of motion, or the appearance of any animal function, and the lively half-winged Locust, or the Cicada—animals sporting in the full enjoyment of life. The Bot, imprisoned in its oval covering, without the least external sign of animation, is termed a pupa. The Moth, quiescent for months, concealed in its shelly covering in the earth, or suspended in its silken envelope to the branch of a tree, is a pupa; and we denominate those also which have the wings only half expanded pupæ; though, like the nimble-footed Cimex, they are perpetually

roving, and deriving sustenance from the blood of other animals; and so, also, the restless Libellula, which is continually traversing the watery element, with almost the facility of a fish, in search of its prey. Modern writers have, therefore, considered this state as essential in the formation of orders; and have even laid down certain rules, which, taken in conjunction with the characters of the perfect insect, are often of great use in ascertaining the order to which any genus belongs. In our account of the larva, we have given that of the Lepidopterous order, and shall, therefore, describe the pupa of the same.

The length of time an insect remains in this form, varies much in different species. As soon as the inclosed animal acquires sufficient strength to break the bonds of its confinement, it makes a powerful effort to escape. The opening through which it passes is always at the same part of the skin—namely, a little above the trunk, between the wings and a small piece which covers the head; different fissures are generally made in the same direction. When the operation begins, there seems to be a violent agitation in the humours contained in the little animal—the fluids being driven with rapidity through all vessels; the limbs and various parts of the body are put in motion; and, by repeated efforts, it breaks through the brittle skin that envelopes it. Those inclosed in cocoons or cases, after bursting through the pupa-covering, have another difficulty to overcome, that of piercing through the inclosure, which, in many instances, is of stronger texture than the case of the pupa. For the accomplishment of this, most insects are provided with a liquor, which they discharge from the mouth upon that part of the cocoon through which they intend to escape; and this so moistens and weakens it, that after a short time they force their passage through with tolerable facility. Some insects, which are not provided with this fluid, leave one end of their cone weaker than the rest, and close it only with a few threads, so that a slight effort of the head enables the insect to burst from its prison.

The last stage of the life of insects is termed the imago, or perfect state. The Butterfly, or Moth, on emerging from the pupa, is moist, the abdomen is swollen, the antennæ are bent down, and the wings crumpled, small, and shapeless. These parts are gradually unfolded, and take their destined forms. The elytra assume their brilliant colours, the wings expand to their proper size, and assume their various markings, and what seemed a few minutes before but an inanimate half-formed mass, is transformed into an animal decked with the most vivid colours, and rejoicing in its new existence. The operation of expanding their wings, in by far the greater number of insects, occupies only a few minutes;

in some Butterflies half an hour, or an hour; and some species of Sphinx require several hours, or even a day, for this operation. In certain Tipulæ and the Ephemeræ, however, this process is almost instantaneous; and in some species of the latter genus, the insects, after being released from their puparium, and making use of their expanded wings for flight, undergo a slight and further metamorphosis. They fix themselves by their claws in a vertical position upon some object, withdraw every part of the body, and even the legs and wings, from a thin pellicle which covered them like a glove, and so perfect is the resemblance of these exuviæ to the insect, that they may at first sight be mistaken for it.

When the development of the perfect insect is thus completed, it immediately begins to exercise its new powers in their destined functions. It walks, runs, or flies in search of food or others of its own species; and so unerring are its intuitive perceptions of the food which is proper, and the protection which it requires, that the new-formed being becomes at once a free denizen of the air, and is immediately capable of distinguishing, with more than botanical skill, the plants and their juices which are necessary for its support.

The duration of an insect's life in the imago or perfect state, is subject to some variations; but there is not, as in the larger animals, a duration of a medium period, only liable to be shortened by accident or disease, but a conditional one—dependent on the earlier or later fulfilment of a particular function. The general law regarding this period among insects seems to be, that a few days, or at most, a few weeks, after the deposition of the ova, the insects perish. The period for effecting this is longer or shorter, according to the species. Some, as several Ephemeræ, live only a few hours, and never enjoy the enlivening light of the sun; appearing after sunset, and dropping their ova on the surface of their native waters, they perish before the dawning of another day. Others, as Flies, Moths, Butterflies, and indeed the greater part of insects, take a few days or weeks to accomplish the same purpose. A comparatively small number, such as some of the larger Coleoptera, Orthoptera, &c., exist from six to nine, twelve, and even fifteen months; and some instances have been recorded of particular species, when kept and fed, having their existence prolonged considerably beyond this term, but these are exceptions to the general rule. It is further to be remarked, that insect life seems to follow a different law to that which prevails among vertebrated animals, in which the duration of existence is generally observed to be in relation to the period of their attaining maturity; such animals being long- or short-lived, in proportion as they attain their full growth in a longer or shorter space of time. Among

insects, this analogy does not hold, for while the larva of the Goat Moth (*Cossus ligniperda*) is three years, and that of the Cabbage Butterfly not three months, in attaining maturity, yet the perfect insect in both species lives equally long. The *Melolontha vulgaris*, which exists four years in its preparatory stages, lives only eight or ten days as a perfect insect. Some Ephemeræ, whose larvæ have enjoyed two years of preparatory existence, scarcely live beyond an hour; while the common Flesh-fly, whose larvæ attain to maturity in three or four days, exists several weeks.

HABITS AND INSTINCTS OF INSECTS.

On the habits and instincts of some species of insects, volumes have been written without exhausting the subject. The instinctive faculty, of which traces are discovered in the other classes of animated beings, is carried, among insects, to a very great perfection; and human reason seems startled at the contemplation of the little commonwealths which the individuals of some species form by their aggregation. There is something so striking in their combination of means to one common end; so wonderful in the geometrical structure of their dwellings, and the exact determination of the materials to the space and strength requisite for their purposes;—their economy, the wars of rival republics, for spoil or captives, are so astonishing,—that one would feel inclined to doubt the truth of the facts related, were they not established beyond a possibility of contradiction. But although the works and habits of insects announce an industry, of which the higher classes afford few examples, yet their intellectual faculties, beyond the instinctive association and united labour of some, for the common purposes of individual preservation and the continuance of the species, seem otherwise inferior. Insects have, at birth, all the knowledge requisite for these purposes; and this knowledge consists of certain ideas, if they may be so termed, relative to their wants and the employment of their organs. The circle of their action is marked out for them; but so limited, in many cases, are their instinctive faculties, that it has been ascertained, if the pupa be reversed in its cocoon, with its head placed at the end which has no apparatus necessary for its exit, it will perish in the attempt to force its way through the insuperable obstacle, even though a *lateral* opening be made for its escape. The natural faculty, which incites them in a determinate and constant manner, to seek their food, &c., is what is termed instinct; and is better adapted, in its limited aims, than reason, for those passengers over the scene of Nature, whose short period of existence, were they otherwise

qualified, affords them no time to deliberate on means, or to profit by the lessons of experience.

CLASSIFICATION OF INSECTS,

Insects, from their forms, and the peculiar construction of the mouth, and their metamorphoses, may be divided into two grand sections: namely,—AMETABOLIA, insects undergoing no metamorphosis; and METABOLIA, insects undergoing metamorphosis. In the latter are two sub-classes: MANDIBULATA, insects having a biting mouth; and HAUSTELLATA, insects with the mouth suctorial.

AMETABOLIA.

ORDER 1.—THYSANURA: tail armed with setæ (spring tails).
ORDER 2.—ANOPLURA: tail without setæ (Lice).

METABOLIA.

SUB-CLASS I.—MANDIBULATA.

ORDER 3.—COLEOPTERA (Beetles): wings two, transversely folded; covered by two crustaceous, or hard coriaceous elytra, meeting, generally, with a straight suture; mouth with mandibles; metamorphosis complete.

ORDER 4.—STREPSIPTERA: wings two, longitudinally folded; mouth with mandibles; metamorphosis complete.

ORDER 5.—ORTHOPTERA (Grasshoppers and Locusts): wings two, longitudinally folded, with radiating veins, covered by two coriaceous elytra; the margin of one elytron generally covering the same part of the other; metamorphosis incomplete.

ORDER 6.—PHYSOPODA (Thrips): wings four, similar, long, narrow, and fringed; metamorphosis incomplete.

ORDER 7.—NEUROPTERA (Dragon-flies, &c.): wings four, membranaceous, generally of equal size, with numerous veins, usually united by veinlets, forming a net-work; metamorphosis incomplete, or semi-complete.

ORDER 8.—HYMENOPTERA (Bees, Wasps, &c.): wings four, membranaceous,—the hinder ones always smallest; veins not numerous, their branches forming a few meshes, or cells; metamorphosis complete.

SUB-CLASS II.—HAUSTELLATA.

ORDER 9.—LEPIDOPTERA (Butterflies, Moths, and Hawk Moths): wings four, membranaceous, covered with meal-like scales; mouth with a spiral tongue; metamorphosis complete.

Order 10.—Diptera (House-flies): wings two, with halteres, or balancers, at their base; mouth tubular, formed for sucking; metamorphosis complete.

Order 11.—Aphaniptera (Fleas): no wings or elytra; mouth formed for sucking, not constituting a rostrum, or proboscis; metamorphosis complete.

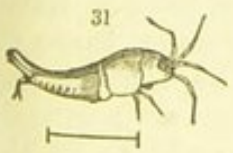
Order 12.—Hemiptera (Bugs, Cicadæ, &c.): wings two, covered by two crustaceous, or coriaceous elytra, the tips of which are sometimes membranaceous; mouth with an articulated rostrum; metamorphosis complete.

The above arrangement of insects is a slight modification of that adopted by Mr. Westwood, in his admirable 'Introduction to the Modern Classification of Insects.' Some of the orders contain a few apterous species, but these will be easily referred to their proper place in the system by the comparison of their general structure.

ORDERS OF INSECTS.

ORDER I.—THYSANURA.

To this order belongs the Podura of Linnæus: a term implying that they have a leg at the tail; which is, almost literally, the fact; for the tail of these insects is furnished with an inflexed fork, which, though usually bent under the body, they have the power of unbending; during which action, the forked spring, pushing powerfully against the plane of position, enables the animal to leap sometimes two or three inches. The toy of the frog, from the elastic spring beneath, will convey to our young friends the principle of this movement. What is more remarkable, these little animals are, by this organ, enabled to leap even upon water. There is a minute black species (*P. aquatica*) which is found, in the winter, on the snow; and, in the spring, is often seen floating on water contained in ruts, hollows, or even ditches; and in such infinite numbers, as to resemble gunpowder strewed upon the surface. When disturbed, these black grains are seen to skip about; jumping with as much ease as if the fluid were a solid plane resisting their pressure. The *Lepisma saccharina* (fig. 31; the line beneath it is the natural size), which also belongs to this order, is not uncommon in damp places about houses; it wanders about during the night. It is supposed to have been originally introduced into Europe from America, where it is said to live amongst sugar.


31

ORDER II.—ANOPLURA.

The animals of this order are parasitical; their motion is slow, and their nourishment is derived from the blood and cutaneous appendages of mammalia and birds. It is almost an established fact, that every species of bird, and, probably, mammiferous animal, has its own peculiar parasite; and there is no instance of the same species having been observed on two distinct species of birds; although some, as the Raven, Oyster-catcher, &c., are infested with several species of parasites. In Mexico and Peru, these animals were so numerous, that the ancient kings found no other means of ridding their subjects of them, than by the imposition of an annual tribute of a certain quantity. Ferdinand Cortes found bags full of them in the palace of Montezuma.

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One section of this order, regarded as a distinct order by some entomologists, is distinguished by the possession of a biting mouth, the true Lice being adapted for obtaining their nourishment by suction. These insects, which are called Mallophaga, creep about amongst the hairs and feathers of mammals and birds, feeding upon the delicate down which grows close to the skin in those animals. From their being most abundant on birds, they are often denominated Bird-lice; the skins of birds are often nearly covered with them in particular spots (fig. 32, Louse of the Goose; the line at the side is the natural size).

ORDER III.—COLEOPTERA.

The insects of this order form a very natural division: they have hard cases to their wings (with a longitudinal suture), which, in some, are united; and therefore such insects have no wings: but the wings in most are two. The mouth is furnished with four, and sometimes six, palpi; two mandibles, and two maxillæ. It is covered above with a labrum, and closed below by the lower lip: they have all six feet in their perfect state. In the antennæ there is the greatest diversity of shape and form. They have a hard, horny skin: on each side they have nine or ten spiracula, three on the thorax, and six or seven on the abdomen. The females lay their eggs in the earth, dung, plants, wood, &c. The larvæ usually have six feet near the head (which differs in form and size in the different genera), jaws at the mouth, two eyes, often short antennæ, and on each side nine or ten spiracula. Those that feed on plants and their roots move but slowly, those which live in dead animals are more active; others, as the Carabidæ, Dyticidæ, and Staphy-

linidæ, which feed on living animals, are very rapid in their motions. We shall further illustrate this order of insects by giving the natural history, as far as our limits will allow, of the most interesting species.

The *Cicindelidæ*, which Linnæus has, with justice, denominated the tigers of insects, are decorated with brilliant colours. They prey upon the whole insect race; their jaws, which cross each other, are armed with fearful fangs; and the extreme velocity with which they can either run or fly, renders hopeless any attempt to elude their pursuit. The larva has six eyes, three on each side, seated on a lateral elevation of the head, like those of spiders; its jaws are armed with a strong internal tooth, and its back furnished with a pair of spines. They inhabit sandy situations, and may be found during the spring months. *Cicindela campestris* is more common than any other of the genus, and is, perhaps, the most beautiful of the six species found in this country (fig. 33, the natural size).

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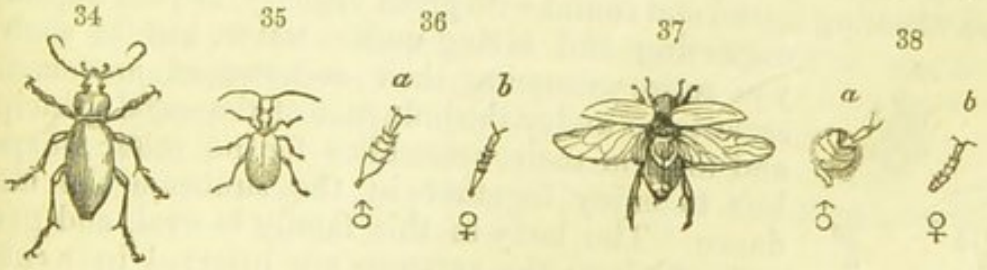
The *Carabidæ* form a very extensive family of insects, of which several hundred species inhabit this country. They are generally found on the ground, under stones, in sand-pits, gardens, &c. The principal distinction is, the antennæ being filiform, and the mouth being furnished with six palpi. The whole of this family are very voracious, preying on all insects which they can overcome. Several species of Carabus are common in this country, and are the largest of our carnivorous beetles. The *Carabus violaceus* (fig. 34) is

34 35 36 37 38



upwards of an inch in length. One of the most singular and interesting insects of this family, is the *Brachinus crepitans*, or Bombardier (fig. 35, natural size), which is rather a local insect; but where they do inhabit, may generally be found in profusion: they secrete themselves during the day beneath stones. When disturbed, they suddenly emit a volatile fluid from the extremity of the abdomen, and this immediately becomes converted into a bluish vapour, accompanied by a slight explosion. This action is evidently designed as a means of defence. The sexes of this family may often be determined by the male having the anterior

tarsus dilated (fig. 36, *a*), whilst the female has it simple (fig. 36, *b*). This is also observable in the *Cicindelidæ*.

The *Dyticidæ* are truly amphibious, for though they live principally in water, they have also the faculty of going upon land and flying in the air, which they generally do late in the evening, and no doubt frequently transport the ova of fishes to distant waters, where they alight; this will, in some measure, account for the fry of fishes being found in pools caused by heavy rains. The general form is oval, more or less oblong; in the larger species the males have the elytra smooth, and those of the females are sulcated. The whole of this family swim well, having the posterior feet compressed, and beautifully fringed with hair. The larvæ also inhabit the water, and feed on the smaller insects, and even on fish. They have a long and narrow body, composed of eleven or twelve segments, of which the first is the largest; the head is large, and furnished with two powerful curved mandibles. The larvæ leave the water in April or May, the period of their transformation, and conceal themselves in the ground, at the sides of ponds and ditches. The perfect insects may be found throughout the year. (Fig. 37, *Colymbetes striatus*, in the act of flying. Fig. 38, *a*, anterior patelliform foot of male Dyticus; *b*, foot of female.)

The insects of the family *Gyrinidæ* are also aquatic, running or swimming in circles on the surface of the water, and when they dive, carrying with them a bubble of air that appears like quicksilver. These beetles, says Mr. Kirby, which may be seen clustering in groups under warm banks, in every river and every pool, and wheeling round and round with great velocity, at your approach dispersing and diving under water, but as soon as you retire resuming their accustomed movements, seem to be under the influence of the social principle, and to form their assemblies for no other purpose but to enjoy together in the sunbeam the mazy dance. The body in this family is oval, and generally shining; the antennæ are inserted in a cavity before the eyes, cylindrical and very short; the head is sunk in the thorax to the eyes, which are large and divided so as to appear as four (*Gyrinus æneus*, fig. 39; *a*, the antenna magnified, *b*, the posterior leg magnified).

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The highly interesting species *Hydrous piceus*, belonging to the family *Hydrophilidæ*, is the largest of all our aquatic insects. The larva, which is black and about three inches in length, lives in still waters and ponds; its head is smooth and chesnut coloured; it has six short slender feet, and a tapering tail, through which it respires. In the month of July it is said to attain its utmost size; at that time it quits the water and makes a hole in the bank,

pretty deep, and so wide that it can lie in it rolled up in a circle; it there changes into its pupa state. About the middle of August the perfect insect appears. Like most of the aquatic insects, it lives through the winter, diving deep into mud during the most inclement weather (fig. 20, p. 172).

The *Silphidæ* are of great importance in the economy of nature, as both the larvæ and perfect insects feed on carrion; the latter are furnished with large wings, and the perfoliated antennæ appear well adapted—if they be organs of scent—to direct them to their food. Some of them, forming the genus *Necrophorus*, are called Burying Beetles, from their habit of interring the bodies of other animals. A small dead animal is soon visited by a number of these beetles, which join in burying it, after they have deposited their eggs in its body. A mole or mouse is often buried, by the industry of four or five of them, in the space of four-and-twenty hours: they scoop out the earth all round and below the animal, which gradually sinks down, while the agents are invisible. The larvæ undergo their change in the earth. (*Silpha quadripunctata*, fig. 40.)

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The *Staphylinidæ* form a numerous family, distinguished by the shortness of their wing-cases (fig. 28), under which a pair of ample wings is concealed. They are very abundant in this country, and are usually of blackish or dark colours. Some of the species live in decaying animal and vegetable substances, others are found running upon the ground, but most of them appear to be predacious in their habits. When disturbed or alarmed, they turn up their tails and open their jaws in a threatening manner, as may be well seen in the large black species (*Ocypus oleus*), common in out-houses, and well known under the name of the *Cock-tail*. The families *Histeridæ* and *Byrrhidæ*, which follow the *Staphylinidæ*, offer little in their habits to detain us.

The eggs of the common Cockchafer (*Melolontha vulgaris*), which is one of the most abundant of the great family of *Lamellicorn* beetles, are deposited in the ground by the winged insect; from each of them proceeds, after a short time, a whitish worm, which grows about an inch and a half long, with six legs, a red head, and strong claws, which is destined to live in the earth four years, and there undergo various intermediate changes of its skin, until it assumes its chrysalis form. It subsists, during its subterranean abode, on the roots of trees and plants, committing ravages, often of the most deplorable nature. These creatures sometimes, in immense numbers, work between the turf and the soil, in the richest meadows, devouring the roots of the grass to

such a ruinous extent that the turf rises, and may be rolled up with almost as much ease as if it had been cut with a turfing-spade, while the soil beneath, for about an inch in depth, is turned into a soft mould, like the bed of a garden; in this the grubs lie, in a curved position, on their backs, the head and tail uppermost, and the body buried in the earth.

In the year 1688, the Cockchafers appeared on the hedges and trees of the south-west coast of the county of Galway, in clusters of thousands, clinging to each other in the manner of Bees when they swarm. During the day they remained quiet, but toward sunset the whole of them were in motion, and the humming noise of their wings sounded like distant drums. Their numbers were so great that, for the space of two or three square miles, they entirely darkened the air. Persons travelling on the roads, or who were abroad in the fields, found it difficult to pursue their course, as the insects were continually beating their faces, and caused great pain. In a very short time the leaves of all the trees in the neighbourhood were destroyed, leaving the face of the country, although it was near Midsummer, as naked and desolate as if it were the middle of winter. The noise that these enormous swarms made in seizing and eating the leaves was so loud as to have been compared to the distant sawing of timber. Swine and poultry devoured such clusters of them, as they fell from the trees, that they soon became fat, without any other food. The insects having at length eaten up the whole produce of the ground, the inhabitants adopted a mode of dressing them for food. Toward the end of summer they disappeared so suddenly that in a few days there was not a single one left (Common Cockchafer, fig. 41).

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Among the *Lamellicornia* is the Rose Beetle (*Cetonia aurata*), than which there is scarcely any of the English Coleopterous insects more beautiful. The upper parts of the female are of a shining green colour, varying according to the light in which it is held, and marked transversely on the wing-cases with a few short white or yellowish lines. The male is of a burnished copper colour, with a greenish cast. They are to be found on flowers during the month of June, particularly on those of the rose or peony. The grubs that produce this Beetle feed under ground, most commonly at the roots of trees, and never appear on the surface, unless disturbed by digging, or some other accident. They are supposed to be injurious to the gardener, from their devouring the roots of plants and trees. The female deposits her eggs in the middle of June. For this purpose she burrows into soft, light ground, hollowing it out so as to form a proper recep-

tacle. When this operation is complete, she returns to the surface and flies off, but seldom lives more than two months afterwards. The grubs are produced in about fourteen days, and immediately seek for food, which is never far distant, as the parent always lays her eggs near a supply of provision proper for the infant larvæ.

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As soon as they have attained sufficient strength, the young grubs separate, each burrowing a different way in search of roots. They remain four years in this state, annually changing their skin, till they become of full growth; at that time the larva is of a cream colour, with a brown head and feet. During winter they eat but little, if at all, and retire so deep into the ground as to avoid the effects of the frost (fig. 42, Rose Beetle).

The common Stag Beetle (*Lucanus cervus*), belonging to the family *Lucanidæ*, is the largest of the British COLEOPTERA; the larva is white, and lives on wood, generally oak or willow; its head and feet are of a rust colour. The perfect insect varies in size and colour; in general it is dark brown or blackish, the jaws are very large—about one third of the length of the whole insect, and have a distinct resemblance to the horns of a stag; the female, which is less than the male, wants these, or at least they are shorter than the head. This species is occasionally found in profusion in Kent and Surrey during the months of June and July. It appears that such larvæ as feed on the oak generally produce the finest specimens, and that those which feed on the willow are much smaller; the males fly in the evening, the females are seldom observed on the wing (fig. 42, the male Stag Beetle).

43

The family *Buprestidæ* is peculiarly distinguished by the beauty of their colours. The species of this country are small and few; but the exotic species, besides being numerous, are remarkable for their size, and possess the lustre of polished gold and emeralds. In others, azure blue is reflected on a golden base, and a metallic lustre, of various kinds, is almost always present. The Buprestidæ walk slowly, but their flight is rapid when the weather is dry and warm. The larvæ, which feed on dry wood, appear to live many years without a metamorphosis. A curious account, relative to one of this family, has been given by the late Mr. Marsham, which we shall quote for our young friends: "On the 3d of January, 1810, James Montague, Esq., one of the surveyors to the corporation of London, on going to his desk, in the office of works, at Guildhall, observed an insect, which had been seen by his brother in the early part of the day, endeavouring to extricate itself from the

wood which formed part of the desk. Mr. Montague, with his penknife, carefully released it from its cell, and it proved to be a beautiful Coleopterous insect, of the genus Buprestis, full of strength and vigour. The desk, which is eight feet nine inches long, and three feet five inches wide, is made of fir-wood, which is perfectly sound. It was fixed in the office in the year 1788 or 1789, and it has remained there untouched ever since, excepting about three years ago it was planed to remove some ink spots, by which operation the animal had a very narrow escape from being discovered, as was apparent from the thinness of the wood over the cell, when it attempted to come out. The insect, with a piece of the wood, about a foot square, cut out nearly from the middle of the desk, was sent to Sir Joseph Banks; but a thin shaving had previously been taken from the surface of the board by the officious care of a carpenter, who chose to shave away the stains of ink." This insect appears to have been the *Buprestis splendens*, which is occasionally found in Sweden. The wing-cases of the larger Indian species are frequently used by the ladies of the East, as ornaments for the head and other parts of their dress. *Agrilus viridis* (fig. 44) inhabits the birch-trees of this country (*a*, one of the antennæ magnified).

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The apparatus with which the insects of the family *Elateridæ* are provided, for the purpose of raising themselves when placed on their back, which is a difficult task for many of the Coleopterous insects, is both singular and curious. A strong spine projects from the hinder extremity of the prosternum, and there is a groove, or cavity, in the anterior part of the next segment. When laid on its back, the insect raises and sustains itself on the anterior part of the head and the extremity of the body, by which means the spine is removed from the groove where it is lodged when in its natural position; then suddenly bending its body, the spine is struck with force across a small ridge, or elevation, into the cavity from whence it was withdrawn, by which shock the parts of the body before sustained in the air are so forcibly struck against whatever the insect is laid on, as to cause it to spring, or rebound, to a considerable distance. The antennæ are lodged in a cavity, scooped out of the under side of the head and thorax, which completely preserves them from injury when the insect falls after its singular leap. The *Agriotes segetis* (fig. 45), known in its larva state as the Wire-worm, causes, annually, a large diminution of the produce of our fields, destroying, indiscriminately, wheat, rye, oats, and grass.

45

The family *Telephoridæ* includes, together with many similar Beetles, the common garden insects well known to most children under the names of Soldiers and Sailors. They are distinguished

by the softness of their bodies and the flexibility of their elytra. They are carnivorous in their habits, devouring any small insects that come in their way, and not even sparing their own kind. Their larvæ are also predacious, they live in the ground or amongst moss, and the pupæ may frequently be met with by the gardener when digging.

The Death-watch, one of the *Ptinidæ*, is a dusky and somewhat hairy insect, with irregular brownish spots; it is about a quarter of an inch in length. In the advanced state of spring these insects usually commence their noise, which is no more than a call or signal, by which they mutually attract each other, and it may be considered as analogous to the call of birds. This noise does not arise from the voice, but from the insect's beating on some hard substance with the fore part of the head. The general number of successive distinct strokes is from seven to nine or eleven. These are given in pretty quick succession, and are repeated at certain intervals. In old houses, where the insects are numerous, they may be heard, if the weather be warm, almost every hour in the day. The noise exactly resembles that made by beating with the nail on a table. To this group belongs the celebrated worm which is so injurious to books. M. Peignot mentions an instance of twenty-seven folio volumes, in a public library but little frequented, being perforated, in a straight line, by the same insect (probably *Anobium pertinax*, or *striatum*), in such a manner, that on passing a cord through the perfectly round hole made by it, these twenty-seven volumes could be raised at once. *Anobium tessellatum* (fig. 46, natural size), is occasionally found in the wood of decayed willow trees.

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The *Cantharidæ* include in their ranks several most valuable medicinal insects, such as the common *Cantharis*, or Blister-fly, and some allied species which are used for the same purposes in various parts of the world. Of the British species the best known is the Mayworm, or *Meloë*, a soft, bluish-black Beetle, with short elytra, overlapping each other at the base. The *Meloë* usually makes its appearance in May, crawling sluggishly over the herbage of sandy heaths and similar localities. The female deposits a great number of yellow eggs in a hole in the ground, and the history of the larvæ hatched from these is one of the most singular in the range of Entomology. The young larvæ are minute, active creatures, provided with six legs, by means of which they soon crawl up into the flowers which bloom around their birth-place. Here they lie concealed until the flower is visited by one of the Wild Bees, busied in procuring a store of food for her progeny; then the lurking larvæ creep upon the body of the Bee, and,

clinging to its hairs, are thus unsuspectingly introduced into its nest. At a later period they devour the larvæ of the Bee, and, when full grown, become large black grubs, with scaly heads. They undergo their further metamorphoses in the cells of the Bees.

The Weevil of the Nut (*Balaninus nucum*), which is a good example of the vast family *Curculionidæ*, proceeds from a very small brown egg, which the parent deposits in the shell of the nut, at a time when it is very soft and tender. As soon as the heat of the season has perfected the little grub, it eats its way out of the egg, and through the shell into the nut. Its chief food at this time is the coat of the nut, or that part which afterwards hardens into the shell; and it continues to feed on this and the interior pulp until the one becomes too hard and the other too dry for its sustenance. It then attacks the kernel, which by that time is grown large enough to afford it support; this seems a most providential instinct, for had the Curculio begun to feed on the kernel when small, it would have destroyed that on which its future support depended, as well as the principal food allotted to it by Nature, while in the larva state. When full grown, the grub eats its way through the shell of the nut, and buries itself in the earth, where it changes into a chrysalis in the course of the following spring, and about the beginning of May assumes the Beetle form (fig. 47).

47

The grubs of the Palm Weevil (*Calandra palmarum*), an insect belonging to this family, which are as large as the thumb, have been long in request in Demerara and Surinam as an article of food, both by the whites and blacks, who empty, wash them in salt and water, and dress them by roasting or frying them in butter or crumbs of bread; when properly cooked they are said to be exquisite.

The family *Cerambycidæ* is numerous, but few of the species are inhabitants of Britain. Their larvæ live in wood, which they perforate and consume. They are the favorite food of woodpeckers; they have shorter feet than the larvæ of most other Coleoptera. The antennæ are often longer than the body of the perfect insect; they are bent, and have some resemblance to the horns of a goat. The thorax of the *Aromia moschata* (fig. 48) is armed with a spine; the antennæ are bluish, and of the same length with the body. It is one of the largest of the British species; it varies much as to colour, being green, purple, or cop-

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pery; the body dark blue; it has a very strong rose-like smell. The larvæ feed on the soft wood of willows. In June the perfect insect appears, and when taken emits a peculiar noise, produced by the movement of the prothorax over the base of the scutellum. The great strength of the jaws in these wood-eating Beetles is evidenced by the fact, that they have repeatedly been known to eat through sheet lead and lead pipe when the wood containing their pupæ has been worked and used in buildings.

The insects of the family *Chrysomelidæ* are, for the most part, nearly hemispherical, and adorned with shining and splendid colours. They live on leaves, but do not eat the nerves. Their larvæ are soft, and, in general, of an oval shape, somewhat elongated, with six feet near the head. The last joint of their feet, or the tarsus, consists of four articulations. *Chrysomela populi* (fig. 49) is found on the aspen: this is one of the larger of the British species of this family. The elytra are red and finely punctured, and have a small black spot at the apex. The larva commits great ravages on the leaves of the aspen, leaving nothing but the nerves. It is variegated with black and white, and, when touched, it discharges a very fetid oily matter from a double row of tubercles on its sides. To the family *Cassididæ* belongs that very curious insect, *Cassida equestris* (fig. 50), which is found frequently on thistles, and some other plants. The body is oval, convex above, and flat below. The elytra project over the sides, and totally cover the whole body, so that no part of it is seen. The larva has six feet, and feeds on the thistle; it is broad, short, and depressed, with acute spines on the sides; its tail is recurved, and terminates in a sort of fork. The larva often changes its skin. The pupa is broad, flat, and almost oval, surrounded with a number of fringe-like appendages, and with an arched band, or front. It is of a pale green colour, and found on thistles. In fifteen days the perfect insect appears.

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The next family we have to mention, *Coccinellidæ*, includes the insect commonly called, in England, the Lady-bird (fig. 51). The larvæ feed on the Aphides, or Plant-lice, and are beneficial in gardens and hop-grounds on that account. The species are numerous and subject to great variety. Several of the species live through the winter and appear early in the spring In 1807, the shores at Brighton, and all the watering-places on the south coast, were literally covered with Lady-birds, to the great surprise, and even alarm, of the inhabitants, who were ignorant that their little visitors were emigrants from the neighbouring hop-grounds; where, in their larva state,

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each had slain his thousands and tens of thousands of the Aphis, which, under the name of the Fly, so frequently destroys the hopes of the hop-grower.

ORDER IV.—STREPSIPTERA.

Mr. Kirby, in the second volume of his 'Monographia Apum Angliæ,' gives the following account of *Stylops melittæ*:—"Upon this insect (*Melitta nigro-ænea*) I discovered, last spring (1801), a very singular animal, which seems appropriate to the present genus. I had previously, more than once, observed upon other species, something that I took to be a kind of Acarus, which appeared to be immoveably fixed just at the inosculations of the dorsal segments of the abdomen. At length, finding three or four upon a specimen of *Melitta nigro-ænea*, I determined not to lose that opportunity of taking one off to examine and describe; but what was my astonishment, when, upon my attempting to disengage it with a pin, I drew forth, from the body of the Melitta, a white fleshy larva, a quarter of an inch in length,—the head of which I had mistaken for an Acarus! After I had examined one specimen, I attempted to extract a second; and the reader may imagine how greatly my astonishment was increased, when, after I had drawn it out but a little way, I saw its skin burst, and a head as black as ink, with large, staring eyes, and antennæ consisting of two branches, break forth and move itself briskly from side to side! It looked like a little imp of darkness just emerging from the infernal regions. My eagerness to set free from its confinement this extraordinary animal may be easily conjectured: indeed, I was impatient to become better acquainted with so singular a creature. When it was completely disengaged, and I had secured it from making its escape, I set myself to examine it as accurately as possible; and I found, after a careful inquiry, that I had not only got a nondescript, but also an insect of a new genus, whose very class seemed dubious." Since the above, the assiduous J. C. Dale, Esq., of Dorsetshire, has discovered several new species of this highly interesting order of insects. His observations upon one of these we shall take as given by Mr. Curtis in his 'British Entomology:'—"Every specimen of *Andrena barbilabris* I have seen this year, from the 27th of April to the 4th of June (1828), has contained larvæ, pupæ, or exuviæ of Stylops, from one to three in each. On the 5th of May I picked one out with a pin; on the 7th, another, rather immature; and caught one flying, in the hot sunshine, over a quickset hedge in the garden: it looked milk-white on the wing, with a jet-black body, and totally unlike anything else; it flew with an undulating,

or vacillating motion, among the young shoots, and I could not catch it till it settled on me; when it ran up and down, its wings in motion, and making a considerable buzz, or hum, nearly as loud as a Sesia. It twisted about its rather long tail, and turned it up like a Staphylinus. I put it under a glass, and placed it in the sun; it became quite furious in its confinement, and never ceased running about for two hours. The elytra, or processes, were kept in quick vibration, as well as the wings; it buzzed against the sides of the glass, with its head touching it, and tumbled about on its back." (Fig. 52, *Stylops melittæ*, magnified; the line, *a*, shows its natural size.)

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a

Other observers also have been engaged, of late years, in the investigation of these singular insects, and, from their results, it appears that the males alone are winged; and that the females always retain a maggot-like form, and remain concealed within the Bees; they were formerly not distinguished from the larvæ. The young larvæ are small, active, six-legged creatures, which run about among the hairs of the Bees containing the females, and are left by them upon the flowers; here they attach themselves to other Bees, and are, by them, carried to their new-made nests, where they penetrate the body of the Bee-larva, and live parasitically in it until it attains its full development. As it has been found that something very similar to this occurs in some Beetles, the Strepsiptera are now generally regarded as most nearly allied to the Coleoptera, and even, by many entomologists, as forming a portion of that order of insects.

ORDER V.—ORTHOPTERA.

The Common Earwig (*Forficula auricularia*), belonging to the family *Forficulidæ*, is a well-known insect, and easily distinguishable from all Beetles, by the forceps, or pincers, at the end of its tail. The larva differs very little in its external appearance from the complete insect, except that it has neither wings nor elytra, and that the breast and thorax are not distinguishable. In this state it is a very lively little animal, running about with great agility, even from the instant it leaves the egg. It may not, perhaps, be generally known, that the Earwig is possessed of wings, and that one of them will nearly cover the whole insect. The elytra, or wing-cases, are short, and extend, not along the whole body, but only over the first two joints of the abdomen. Beneath

these the wings are concealed: they are somewhat of an oval shape, and, when extended, are nine or ten times as large as the elytra. There is a degree of elegance in the manner in which the insect folds them beneath. They are first closed up, lengthwise, from a centre, close to the body, like a fan; and, afterwards, refolded across in two different places,—one about the middle of the membrane, and the other at the centre, from whence the first folds proceed. By these means, the wing is reduced into a small compass, and proportioned to the size of the case under which it is to lie.

It is a circumstance extremely singular, that unlike those of most other of the insect tribe, the eggs are hatched and the young Earwigs fostered by the parent. At the beginning of the month of June, M. De Geer found, under a stone, a female Earwig accompanied by many little insects, which, evidently, appeared to be her own young. They continued close to her, and often placed themselves under her belly as chickens do under a hen. He put the whole into a box of fresh earth. They did not enter the earth; but it was pleasing to observe how they thrust themselves under the belly and between the legs of the mother, who remained very quiet, and suffered them to continue there sometimes for an hour or two together. This gentleman gave them a piece of a very ripe apple: in an instant the old one ran upon it, and ate with a good appetite; the young ones also seemed to eat a little, but, apparently, with much less relish. On the 8th of June he remarked that the young Earwigs had changed their skins; and he found also the sloughs which they had quitted. This moulting produced only a slight change in their figure, yet it evidently brought them nearer to the perfect insect. At another time, about the beginning of April, he found a female Earwig, under some stones, over a heap of eggs, of which she took all the care imaginable, without ever forsaking them. He placed both the female and her eggs in a box half filled with fresh earth, and dispersed the eggs up and down in it. She, however, soon removed them, one after another, carrying them between her jaws; and, at the end of a few days, he saw that she had collected them all into one place upon the surface of the earth, and remained constantly on the heap, without quitting it for a moment, so that she seemed truly to sit for the purpose of hatching her eggs. The young were produced about the 13th of May. In figure they were similar to those before mentioned; but at birth they were all white, except towards the tail, where a yellow matter was observable through the skin, and the eyes and teeth, which were reddish. He kept them in a box with their mother, feeding them from time to time with bits of apple. He perceived that they

grew daily, and changed their skins more than once. The mother died, and her progeny devoured nearly the whole of her body. The little ones that died underwent also the same fate. M. De Geer, however, conjectures that this took place only from want of other food, as he had neglected to supply them regularly with nutriment. On the 23d of July one only remained alive: it was full grown, and then in the nymph or pupa state.

This insect, though in its nature extremely harmless, except in gardens, to fruits and vegetables, has fallen, in a very particular manner, a victim to human cruelty and caprice; originating in the idea, that it introduces itself into the ears, and from thence penetrates to the brain, and occasions death. We must be permitted to express a wish, that females, who but too commonly lay aside all ideas of tenderness at the very sight of it, would be convinced, that the wax and membranes of the ears are a sufficient defence against all its pretended attacks upon those organs. Our gardeners have, it is true, some reason for complaint: it lives among flowers, and frequently destroys them; and when fruit has been wounded by flies, the Earwigs also generally come in for a share of it. In the night they may often be seen, in amazing numbers, upon lettuces, and other esculent vegetables, committing those depredations that are often ascribed to snails or slugs. The best mode, therefore, of destroying them seems to be, to attend the garden, now and then, in the night, and to seize them while they are feeding. The bowl of a tobacco-pipe, and the claws of lobsters, stuck upon sticks that support flowers, are the usual methods by which they are caught, as, in the day-time, they creep into holes and dark places. Placing hollow reeds behind the twigs of wall-trees is also a good mode, if they be examined and cleared every morning; but at a midnight visit, more may be done in an hour than by any other means in a week. (Fig. 53 is the Common Earwig with the wings expanded.)

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Of the family *Blattidæ* the species are numerous, and few countries are without them. In a state of nature, they inhabit trees, concealing themselves, during the day, beneath loose bark, and under leaves, &c. The common Black-beetle, or Cock-roach, was, originally, a native of India, but is now very generally spread throughout Europe. In tropical climates Cock-roaches are a complete nuisance. These nasty and voracious insects, says Mr. Drury, fly out in the evening and commit monstrous depredations: they plunder and erode all kinds of victuals, dressed and undressed; and damage all sorts of clothing, especially those which are touched with powder, poma-

tum, and similar substances; everything made of leather, books, paper, and various other articles, which, if they do not destroy, at least they soil. He proceeds to state, that they fly into the flame of candles, and sometimes into the dishes; are very fond of ink and of oil, into which they are apt to fall and perish. In this case, they soon turn most offensively putrid, so that a man might as well sit over a cadaverous body of a large animal, as write with the ink in which they have died. They often fly into persons' faces or bosoms; and their legs being armed with sharp spines, the pricking excites a sudden horror, not easily described. In old houses they swarm by myriads, making every part filthy beyond description wherever they harhour; which, in the day-time, is in dark corners; behind all sorts of clothes; in trunks, boxes, and, in short, every place where they can be concealed. In old timber and deal houses, when the family is retired at night to sleep, these insects, among other disagreeable properties, have the power of making a noise which very much resembles a pretty smart knocking with the knuckles upon the wainscoting. The *Blatta gigantea* of Linnæus, in the West Indies, is, therefore, frequently known by the name of the Drummer. Three or four of these noisy creatures will sometimes be impelled to answer one another, and cause such a drumming noise, that none but those who are very good sleepers can rest for them. *Blatta Germanica* (fig. 54) is occasionally found in houses, and is said to drive out the larger species.

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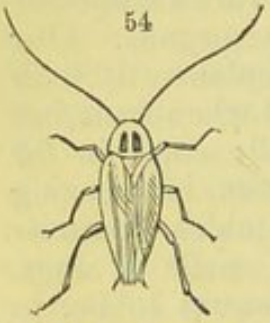

The House Cricket (*Acheta domestica*, fig. 55), a species of the family *Achetidæ*, resides altogether in our dwellings, and frequently intrudes itself on our notice. These insects are partial to newly built houses; the softness of the mortar enabling them to form their retreats, without much difficulty, between the joints of the masonry, and immediately to open communications with the different rooms. They are particularly attached to kitchens, bakehouses, and such other places as afford them that constant warmth in which they take so much delight. Tender insects that live abroad, says Mr. White, either enjoy only the short period of one summer, or else doze away the cold, uncomfortable months in profound slumbers; but these, residing, as it were, in a torrid zone, are always alert and merry; a good Christmas fire is to them what the heats of the dog-days are to others. Though they are frequently heard by day, yet their natural time of motion is only

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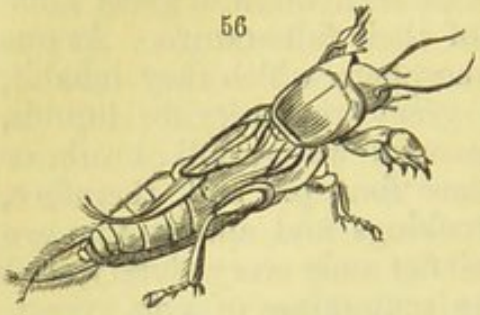
in the night. As soon as it becomes dusk, the chirping increases; they come running forth, and are to be seen often in great numbers, from the size of a Flea to that of their full stature. As one would suppose, from the burning atmosphere which they inhabit, they are a thirsty race, and show a great propensity for liquids, being found frequently drowned in pans of water, milk, broth, or the like. Whatever is moist they are fond of; and, therefore, often gnaw holes in wet woollen stockings and aprons that are hung to the fire. These Crickets are not only very thirsty, but very voracious; for they will eat the scummings of pots, yeast, salt, and crumbs of bread; and any kitchen offal or sweepings. In the summer they have been observed to fly, when it becomes dusk, out of the windows, and over the neighbouring roofs. This feat of activity accounts for the sudden manner in which they often leave their haunts, as it does, also, for the method by which they come to houses where they were not known before. It is remarkable, that many sorts of insects seem never to use their wings but when they wish to shift their quarters and settle new colonies. When in the air, they move in waves, or curves, like the woodpeckers, opening and shutting their wings at every stroke, and thus are always rising and sinking. When they increase to a great degree, they become pests; flying into the candles, and dashing into people's faces; but they may be blasted by gunpowder discharged into their crevices and crannies. In families, at such times, they are like Pharaoh's plague of frogs,—"in their bed-chambers, and upon their beds; and in their ovens, and in their kneading-troughs." Cats catch Hearth Crickets, and, playing with them as they do with mice, devour them. Crickets may be destroyed like Wasps, by phials half-filled with beer, or any liquid, and set in their haunts; for, being always eager to drink, they will crowd in till the bottles are full. A popular prejudice, however, frequently prevents any attempt at their destruction; many people imagining that their presence is attended with good luck, and that to kill, or drive them away, will surely bring some unfortunate occurrence on the family. When these insects are running about a room in the dark, if they be surprised by a candle, they give two or three shrill notes: these seem to be a signal to their fellows, that they may escape to their crannies and lurking-holes to avoid danger.

The Mole Cricket (*Gryllotalpa vulgaris*, fig. 56), is a complete representation of the mole, among the insect tribes: its fore feet are broad and strong, and, in their formation and position, bear a great resemblance to the fore feet of that animal; they are used for precisely the same purpose—burrowing under the surface of the ground, where the insect commonly resides; and so

expertly does it work them, that it can penetrate the earth with even greater expedition than the mole. The female forms a cell of clammy earth, about the size of a hen's egg, closed up on every side, and within as large as two hazel-nuts. The eggs, amounting to about three hundred, are whitish; they are carefully covered, as well to defend them from the injuries of the weather, as from the attacks of one of the species of Beetles which often destroys them. The female places herself near the entrance of the nest, and whenever the Beetle attempts to seize its prey, the guardian insect catches it behind and bites it asunder. Nothing can exceed the care of these creatures in the preservation of their young. Wherever a nest is situated, fortifications, avenues, and entrenchments surround it: there are, also, numerous meanders which lead to it, and a ditch, which few other insects are capable of passing, encompasses the whole. About the middle of April, if the weather be fine, and just at the close of the day, the Mole Crickets utter a low, dull, jarring note, not unlike the chattering of the Goat-sucker.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Of the Grasshoppers (*Locustidæ*) several species are common in this country; they resemble the Crickets in their powers of leaping and in their fondness for making a continual chirping noise. During the summer months every meadow is vocal with their shrill music, which, however, usually ceases when the auditor approaches too nearly to the concealed performer. This family includes the celebrated Locust (*Locusta migratoria*), the devastations committed by which in many foreign countries have often exposed whole districts to the horrors of famine. This terrible destroyer is occasionally found in England, but, fortunately, it never reaches us in any numbers.

ORDER VI.—PHYSOPODA.

This order includes numerous minute insects, rarely exceeding an eighth of an inch in length, which may generally be met with in abundance in flowers of all kinds, both in the garden and in the fields, throughout the summer and autumn months. They are distinguished, as already stated, by the beautifully delicate fringes which border their long, narrow wings. Their tarsi consist only of two joints, of which the second is furnished with a little bladder-like organ, which enables the little creatures to cling very firmly to any object, and causes some of them to produce a re-

markable titillation when they run over any delicate part of the skin. Some species are able to leap with great agility, by bending the abdomen under the body, and using it in the same way that the Thysanura do their tails. The *Thrips cerealium*, a small brownish species of this order, infests the young ears of wheat when in flower, and often does much injury to the crops.

ORDER VII.—NEUROPTERA.

Many of the larvæ of this order of insects reside in the water, and do not leave it till they change to the perfect insect; others are terrestrial; some are found under the bark of trees, and others are concealed in sand. These larvæ are generally carnivorous. The metamorphosis is not the same in all species. The larvæ which are found in the water have organs which, at first sight, appear analogous to the gills of fishes, but which are, in fact, tracheal appendages. Some of them construct a case of different kinds of materials, which they carry about with them. Many of the NEUROPTERA, in their perfect state, such as the Ephemeræ, take little or no food, and in that state live for a very short period; while others, as the Libellulæ, are carnivorous, and hovering over the places where they expect to find their prey, dart upon it with all the eagerness of the hawk.

The insects of the family *Libellulidæ* are remarkable for their elegant form and the brilliancy of their colours; their motions are light and airy, their dress is silky and variegated, and its trimming excels the finest lace (*Libellula depressa*, female, fig. 57). Their habits are truly carnivorous, and they are not very nice in the choice of their food. In their rapid flight they seize small flies, and even the Flesh-fly and Butterflies, the wings of which they immediately bite off, and then devour the bodies. They follow their prey from five in the morning until late in the evening, even to the time of the appearance of the night-flying insects, which they pursue along the hedgerows. The larvæ are a terror to the aquatic insects in those waters where they reside. Having no swimming feet, they are obliged to walk at the bottom of ponds, and crawl up the stems of aquatic plants in quest of food. The larva is furnished with a strong, offensive weapon, which in a state of rest covers the face

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like a mask (fig. 58); this the animal is capable of thrusting forward (see fig. 59); with the forceps it seizes its prey and immediately conveys it to the mouth. They remain in the larva state from autumn to the ensuing summer, when, having passed with little alteration to the pupa state, they crawl up the stalk of some aquatic plant, and wait until the skin splits at the upper end of the thorax; the insect then issues forth gradually, throws off the slough, and in a short time expands its wings, flutters, and flies away.

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The Day Flies (*Ephemeridæ*), in their first and intermediate state, are aquatic; they either live in holes in the banks of rivers or brooks, below the water, so that it enters into their habitations, which they seldom quit, or swim about, or walk upon the bed of the stream, or conceal themselves under stones or pieces of stick. Though their life, when they assume the perfect state, is usually of extremely short duration—some being disclosed after sunset, laying their eggs and dying before sunrise, and many not living more than three hours—yet in their preparatory state their existence is much longer, some living one, others two, and others, again, even three years. The various species assume the imago at different times of the year; but the same species appear regularly at nearly the same period annually, and for a certain number of days fill the air in the neighbourhood of the rivers; they emerge also from the water at a certain hour of the day. The season of different harvests is not better known to the farmer than that in which the Ephemeræ of a particular river are to emerge is to the fisherman; yet a greater degree of heat or cold, the rise or fall of the water, and other circumstances, may accelerate or retard their appearance. Between the 10th and 15th of August is the time when those of the Seine and Marne, which Reaumur described, are expected. He first observed these insects in the year 1738, when they did not begin to show themselves in numbers till the 18th of August. On the 19th, having received notice from his fishermen that the flies had appeared, he got into his boat about three hours before sunset, and detached from the bank of the river several masses of earth filled with pupæ, which he put into a large tub of water. Having remained in the boat till about eight o'clock, without seeing any remarkable number of flies, and being threatened with a storm, he landed, and placed the tub in his garden, at the foot of which ran the Marne; an astonishing number of Ephemeræ soon made their appearance. Every piece of earth above the surface of the water was covered by them, some beginning to quit their slough, others prepared to fly; be-

sides these, many were already on the wing, and numbers might be seen in all directions beneath the surface of the water, in a greater or less degree of forwardness. The storm coming on, he was obliged to quit the amusing scene, but when the rain ceased he returned to it, and removed the cloth with which he had ordered the tub to be covered; the number of flies appeared to be greatly augmented, and kept continually increasing; many flew away, but more were drowned. Those already transformed, and continually transforming, would have been sufficient of themselves to have made the tub seem full, but the number was soon very much enlarged by others attracted by the light, which was soon concealed by a layer of these flies that might have been taken by handfuls from the candlestick. But the scene round the tub was nothing to be compared with the wonderful spectacle exhibited on the banks of the river. The exclamations of his gardener drew the illustrious naturalist thither; such a sight he had never witnessed, and could scarcely find words to describe it. The myriads of Ephemeræ, says he, which filled the air above the current of the river, and over the bank on which I stood, are neither to be expressed nor conceived. When the snow falls with the largest flakes, and with the least interval between them, the air is not so full of them as that which surrounded us was of Ephemeræ. Scarcely had I remained in one place a few minutes, when the step on which I stood was quite concealed with a layer of them from two to fonr inches in depth. Near the lowest step a surface of water, of five or six feet in dimension every way, was entirely and thickly covered, and what the current carried off was continually replaced. Many times I was obliged to abandon my station, not being able to bear the shower of Ephemeræ, which falling with an obliquity less constant than that of an ordinary shower, struck continually, and in a manner extremely uncomfortable, every part of my face; my eyes, mouth and nostrils, were filled with them. To hold the flambeau on the occasion was no pleasant office. The person who held it had his clothes covered in a few moments with these flies, which came from all parts to overwhelm him. Before ten o'clock this interesting spectacle had vanished. It was renewed for some nights afterwards, but the flies were never in such prodigious numbers. The fishermen allow only three successive days for the great fall of these flies, which they denominate manna; but a few flies appear before and after, their number increasing in one case, and in the other diminishing. Whatever be the temperature of the atmosphere, whether cold or hot, they invariably appear at the same hour in the evening—that is, between a quarter and half-past eight; towards nine they begin to fill the air; in the following half hour they are in the

greatest number; and at ten there are scarcely any to be seen; so that in less than two hours this infinite host of flies emerge from their parent stream, fill the air, perform their appointed work, and vanish. A very large portion of them falls into the river, when the fish have their grand festival and the fishermen a good harvest. (Fig. 60, *Ephemera vulgata.*)

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The wings of that beautiful genus *Hemerobius*, or Golden-eye, belonging to the family *Hemerobiidæ*, resemble the finest lace; the eyes are as brilliant as burnished gold. The larvæ are insatiable devourers of the Aphides; they are furnished with a pair of long crooked mandibles, resembling horns, which terminate in a sharp point and are perforated, serving the insect instead of a mouth, for through this orifice the nutriment passes down into the stomach. When amongst the Aphides, like wolves in a sheepfold, they make dreadful havoc, half a minute suffices them to suck the largest; and the individuals of one species clothe themselves, like Hercules, in the spoils of their hapless victims (*Hemerobius perla*, fig. 61). The eggs of these insects are very remarkable, being attached to a filiform pedicle, not thicker than a hair, and seven or eight times as long as the egg; the eggs are planted in groups of ten or twelve on the surface of leaves and twigs, projecting like so many small fungi, to some of which they have a remarkable resemblance. (Fig. 62 represents the eggs attached by the pedicle to the leaf of a currant-tree).

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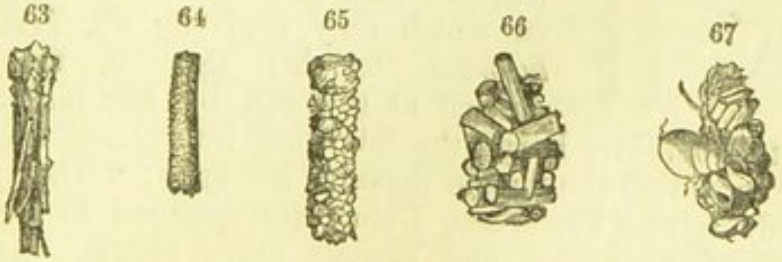
The insects of the family *Phryganeidæ*, differ in some important particulars from the other Neuroptera, and by some writers they are regarded as forming a distinct order called Trichoptera. During their larva state, they are aquatic; and, consequently, the perfect insects are always found near water, in which the females deposit their eggs. The wings in this family are covered with hair; and the smaller species so greatly resemble some of the Tineæ, that, without an intimate acquaintance with the insects, they might be considered as such. Their singular larvæ, also, in many respects, bear a close analogy to the Tineæ; more especially to that group to which the Clothes Moth belongs. We beg leave to quote Messrs. Kirby and Spence's account of the manners of these insects; illustrating it with figures of the cases to which those gentlemen refer:—"If you be desirous of examining the insects to

which I am alluding, you have only to place yourself by the side of a clear and shallow pool of water, and you cannot fail to observe, at the bottom, little oblong, moveable masses, resembling pieces of straw, wood, or even stone: these are the larvæ in question, well known to fishermen by the title of Caddis-worms; and which, if you take them out of the water, you will observe to inhabit cases of a very singular conformation. Of the larva itself, which somewhat resembles the Caterpillars of many LEPIDOPTERA, nothing is to be seen but the head and six legs, by means of which it moves itself in the water, and drags after it the case in which the rest of the body is inclosed, and into which, on any alarm, it wholly retires. The construction of these habitations is very various. Some select four or five pieces of the leaves of grass, which they glue together into a shapely polygonal case; others employ portions of the stems of rushes, placed side by side, so as to form an elegant fluted cylinder; some arrange round them pieces of leaves, like a spirally-rolled ribbon; others inclose themselves in a mass of the leaves of any aquatic plants, united without regularity; and others, again, form their abode of minute pieces of wood, either fresh or decayed. One, like the Sabella, forms a horn-shaped case, composed of grains of sand, so equal in size, and so nicely and regularly gummed together,—the sides, throughout, being of the thickness of one grain only,—that the first time I viewed it, I could scarcely persuade myself it could be the work of an insect. The case of *Leptocerus bimaculatus*, which is less artificially constructed of a mixture of mud and sand, is pyriform, and has its end curiously stopped by a plate, formed of grains of sand, with a central aperture. Other species construct houses, which may be called alive, forming them of the shells of various aquatic snails, of different kinds and sizes, even while inhabited; all of which are immoveably fixed to it, and dragged about at its pleasure,—a covering as singular as if a savage, instead of clothing himself with squirrels' skins, should sew together, into a coat, the animals themselves (*Vide* figs. 63, 64, 65, 66, and 67).



"However various may be the form of the case externally, within it is usually cylindrical and lined with silk; and though seldom apparently wider than just to admit the body of the insect,

some species have the power of turning round in it, and putting out their head at either end. Some larvæ constantly make their cases of the same materials, others employ indifferently any that are at hand: and the new ones that they construct, as they increase in size (for they have not the faculty, like the larva of the Moth, of enlarging them), have often an appearance quite dissimilar to that of the old. Even those that are the most careless about the nature of the materials of their house, are solicitously attentive to one circumstance respecting them—namely, their specific gravity. Not having the power of swimming, but only of walking at the bottom of the water by aid of the six legs attached to the fore-part of the body, which is usually protruded out of the case, and the insect itself being heavier than water, it is of great importance that its house should be of a specific gravity so nearly that of the element in which it resides, as while walking neither to be incommoded by its weight, nor by its too great buoyancy; and it is as essential that it should be so equally ballasted in every part as to be readily moveable in any position. Under these circumstances our Caddis-worms evince their proficiency in hydrostatics, selecting the most suitable substances, and if the cell be too heavy, gluing to it a bit of leaf or straw, or if too light, a shell or piece of gravel. It is from this necessity of regulating the specific gravity, that to the cases formed with the greatest regularity, we often see attached a seemingly superfluous piece of wood, leaf, or the like." (Fig. 68 is the perfect insect of *Phryganea grandis*).

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ORDER VIII.—HYMENOPTERA.

The larvæ of the insects of the family *Tenthredinidæ* have numerous feet, a round head, and when touched, roll themselves together. They all feed on the leaves of plants. When full grown they make a cocoon, sometimes in the earth, and sometimes between the leaves, on the stem, or branch of the plant on which they feed (fig. 69, *Trichiosoma lucorum*, female; fig. 70, the cocoon opened at the top by the insect). We shall quote from Mr. Kirby the following interesting account of the mode in which the female deposits her eggs: "The young of the Saw-fly tribe (*Tenthredo*, Linn.) are destined to feed upon the leaves of rose-trees and various other plants. Upon the branches of these the parent fly deposits her eggs in cells symmetrically arranged, and the instrument with which she forms them is a saw, somewhat like ours, but far more ingenious and perfect,

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being toothed on each side, or rather, consisting of two distinct saws with their backs (the teeth or serratures of which are themselves often serrated, and the exterior flat side scored and toothed,) which play alternately; and while their vertical effect is that of a saw, act literally as a rasp. When by this alternate motion the incision or cell is made, the two saws, receding from each other, conduct the egg between them into it."

The family *Ichneumonidæ* includes an immense number of insects, varying greatly in size, some of them being very minute, whilst others measure upwards of an inch in length. They are all parasitic in the larva state, in the bodies of other insects, the females being furnished with a sharp ovipositor, with which they pierce the skin of their victims and introduce their eggs. The insects thus attacked, which are usually in the larva state, continue to live and grow until they attain their maturity, when they frequently change into pupæ without giving any indication of their being infested with a parasite; the latter then becomes converted into a pupa within the skin of the creature whose substance it has consumed. In some cases, however, the larvæ of the Ichneumons break out of the skin of their victim and undergo their transformations in the open air. By the check which they impose upon the multiplieation of caterpillars and other injurious insects, the Ichneumons must be regarded as very useful to man.

The insects of the Ant tribe (*Formicidæ*), live in societies composed of three sorts of individuals, males and females, winged, and neuters apterous. As indicated by the name, the animals of the group include the primitive genus, Formica, or the Ant. The neuters, or workers, are exclusively employed in constructing or preparing the habitation of the society; feeding, watching, and defending the young; and in preserving, with care, the ova for the continuance of the species. The males and females are found but temporarily under their last form in the Ant-hills, which they leave as soon as they have acquired wings. The males are much smaller than the females, and after they have taken flight, never again revisit their former dwelling. The females, on the contrary, tear off their wings, return, and are retained by the neuters till they have deposited their ova; which are small, round, of a whitish yellow colour, and laid in clusters. The larvæ are like small white worms, thick, short, of a conical form, and destitute of feet; the body is formed of twelve segments. The care of feeding the larvæ devolves on the neuters. They transport them, in fine weather, to the exterior of the habitation, to enjoy a warm temperature, and remove them again at the approach of night; when their dwelling is disturbed, they seize and carry them to places of safety. The pupæ are similar to the perfect insects, but of a soft consistence,

whitish or yellowish, inactive, with wings rudimentary, and are either naked, or inclosed in a silky cocoon. When about to undergo the last change, the neuters tear open the cocoon, and set the complete animal free, retaining those with wings, however, till the weather be favorable for their flight.

The greater part of Ant-hills are composed only of individuals of one species. In some, however, they are mixed; the neuters procuring supplies of population from neighbouring Ant-hills, by expeditions undertaken and executed with all the precision of military detail. If victors in the contest, they carry off the larvæ or pupæ, from the community they attack, and when the captured insects arrive at their perfect state, they either join in the labours of their captors, as in the mixed societies of the *F. sanguinea*, or sometimes they are doomed to do the whole labour of the community, as among the Amazon Ants, the neuters of which confine themselves to the defence of the habitation.

The form and the nature of the different habitations of Ants, vary according to the species; but, in general, they are much more simple than those of other insects which live in societies. Some species lodge in old wood, which they hollow into labyrinths; others have their dwellings under the ground; while many rear their habitations above the surface, in the shape of cones, more or less elevated, composed not only of earth and sand, but of wood, leaves, and other substances within their reach. In all these habitations, different roads, or galleries, are constructed, leading to a natural cavity, the chief abode of the family. Fruits, insects, or their larvæ, and often the dead remains of quadrupeds or birds, form the food of Ants; and if they appear hurtful to vegetation, in some instances, by destroying fruit or plants in the formation of their subterraneous galleries, they are not less useful in another point of view (*Formica rufa*, fig. 71.)

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Wasps (*Vespidæ*), like the bees, are either social or solitary, and are almost equally remarkable for their industry and the structure of their dwellings. But the Bee gathers its food solely from flowers, its sting being only used as a defensive weapon against the attacks of its enemies; while in the Wasp the sting is offensive, and calculated for its predatory and ferocious course of life.

Among the insects of this family may be remarked the Hornet, which forms its dwelling in the holes of old walls, or the hollows of decayed trees; in the latter case, these insects enlarge the cavity by detaching fragments of the decayed wood. The females, having passed the winter in torpidity, on the approach of the warm season, seek a place for the establishment of the colony, and com-

mence operations, by building a thick and solid pillar of the same substance as the other parts of the nest, but much harder and more compact. The matter of which this is formed consists, generally, of the bark of the ash, detached in filaments, and ground by their mandibles into a kind of paste, which hardens as the work goes on. This post, or pillar, is always placed in the most elevated part of the vault; attached to it is a kind of cupola, or roof, of the same materials, which protects the combs from above. Within this vault they place a second column, in some respects a continuation of the first, which forms the base of the first row of the cells of the combs. These cells are hexagonal, and their openings turned downward. In spring, only the female Hornets of the past year are seen: they commence depositing their ova as soon as their cells are ready. These ova are soon hatched, and when the larva acquires sufficient size, it lines its cell with a silky substance, and remains in this covering until its metamorphosis is completed: it then quits the cell in its perfect state. The insects which first appear are the workers: and analogy has led to the belief that these are, as among the Bees, females with imperfect ovaries. They occupy themselves in the construction of the dwelling, and in feeding the larvæ. The female continues to deposit her ova—the family increases in number—the envelope of the nest is enlarged—and, when completed, other combs are formed connected with the first, until the whole cavity is formed, except an entrance about an inch in diameter. Towards the beginning of autumn the young males and females acquire their perfect form, and all the larvæ which have not gone through their transformation before October, perish from cold or want of food; for the Hornets cease to feed them after this period, and even throw them out of the nest.

The common Wasp makes its nest in the ground, generally about six inches deep, of a circular form, and about thirteen inches in diameter; the entrance measures about an inch across; the envelope is of a greyish colour, of a papyraceous consistence, and sometimes of nearly an inch in thickness, with two round holes for entrances; the interior is occupied by many parallel and nearly horizontal combs, resembling those of the Bees in form, but of different material; these combs, to the amount of fifteen or sixteen, are arranged in stages, with intervals between them, and supported, in these intervals, by columns; the edifice is begun at the top, and increased downward. The community is formed of males, females, and workers, or neuters, the last of these, as among the Bees, do all the work: they are continually on the wing, in search of food, destroying fruits, provisions, and even smaller insects. A nest of full combs generally consists of fifteen or sixteen thousand cells, of which each contains an ovum, larva, or pupa; and the larvæ

are fed, as the small birds feed their young, with the food brought to the hive, after being macerated in the mouth of the workers. About twenty days after the ova have been deposited, the larvæ are ready for their metamorphosis into pupæ; these, inclosed in their cells, become perfect insects in the course of eight or nine days; and the cells being then cleared out by the industrious community, are fit for the reception of the ova for a new race. Like the Hornets, the greater part of the Wasps perish in autumn. Some females, destined to perpetuate the species, pass the winter in torpidity; and, in the following spring, each becomes the founder of a new republic, of all the individuals of which she is the mother.

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The neuters, being most useful, are first hatched; the males and females not appearing till toward the end of summer and the commencement of autumn. The males are smaller than the females, and larger than the neuters, and, like the same class among the Bees, are destitute of a sting. The inflammation and swelling, arising from the sting of the Wasp, are more violent than when produced by the sting of the Bee. (Fig. 72, *Vespa crabro,* the Hornet.)

The solitary Wasps are of only two sexes, males and females. The latter construct their nests of mud, which they plaster into cavities in walls and other suitable situations, and hollow out into cells. In these they deposit their eggs, and having laid up in each a suitable provision, consisting of small caterpillars and other insects, for the support of the future larva, they close up the whole with a layer of mud.

Bees (*Apidæ*) are distinguished from the other Hymenopterous insects by the elongation of their lower jaws and lip, in the form of a slender proboscis, terminating generally, in a downy or silky point of the labium. This last part, at the point where it leaves its semi-tubular sheath and the jaws at the insertion of the palpi, is geniculate, and folded below in such a manner, that in the species where these pieces are longest, the trunk extends along the breast. The maxillary palpi are generally very short, almost setaceous, or conical, and consist of from one to six joints; the labial are larger, and have four joints. The Apidæ resemble the other HYMENOPTERA with stings, in the general form of their bodies. All have four wings, with one radial areola (or wing-cell), two or three cubital areolæ, and two recurrent nerves in the upper wings. The abdomen is armed with a concealed sting, and in the females and neuters is composed of six segments; the males have an additional segment: it is generally of an ovoid form, attached

to the thorax by a very short pedicle. The posterior pair of feet are largest; they are very remarkable, in the females and neuters, for the numerous hairs and down with which the legs and the first joint of the tarsi are furnished. These insects fly with rapidity, and with a humming noise, from flower to flower, for the purpose of extracting, by means of their proboscis, which they elongate and sink to the bottom of the corolla, the honey of the nectaries. They collect the pollen, or fine dust of the stamina, upon their posterior legs; this pollen, mixed with a little honey, forms the food of the larvæ. The body of the larva is oblong, narrowed at both extremities, soft, divided into twelve segments, and without feet; the head is small and scaly; it has the appearance of eyes, mandibles, jaws and lips; and, on each side, nine stigmata. After having acquired their full size, the larvæ spin a cocoon, in which they are changed into pupæ. In all the solitary Apidæ of temperate climates, the pupæ do not undergo their last transformation till the following year.

The Societies of Bees include three kinds of individuals;—the workers, or neuters, forming the greater portion of the population; the males, or drones, in limited number; and the females, of which there is generally but one in each, known by the name of the Queen Bee. The workers and the females are armed with a sting; and Mr. Huber, junior, has remarked a difference among the workers, the largest being destined for out-door employment, and the smaller busying themselves in cleaning the cells and feeding the larvæ within. Of the number of Bees in a hive, consisting of from 15,000 to 30,000, the males, or drones, form a portion to the extent of 200 to 1000, or upwards; the queen, or female Bee, one; the remainder are neuters, or workers. The female deposits a great number of ova each day in spring, the cells for which are prepared by the workers, and the deposition of ova ceases in autumn, because then the pollen of flowers, for the support of the larvæ, fails. The individuals first produced are all workers; about the end of two months the ova of the males are laid, and afterwards those for the females, which are all deposited in corresponding cells. The ova are of an oval, elongated form, slightly bent, of a bluish-white colour, about a line long; they are hatched in the course of three, four, five, or six days, according to the temperature. The larvæ produced from these ova are small, wrinkled, white worms, without feet, and they are fed by the workers, who visit each cell for this purpose with their food. The cells not occupied by the larvæ are filled with honey. The combs are placed parallel to one another and perpendicularly, and the cells of which they are composed are of an hexagonal form, constructed with much art and regularity.

The number of Bees in a hive soon increases so much that emigration becomes necessary, and swarms leave the parent hive to form other establishments. In these cases a new hive is prepared for the colony, and many means are used to direct the attention of the emigrants to their new dwelling. When deprived of a queen another is soon produced by the workers, who rear one of their own larvæ for this purpose, which, by a particular treatment, becomes a female. At a certain period of the year the males are put to death, with all their pupæ and larvæ.

Bees are found in a natural state in the forests of Russia, and in different parts of Asia, occupying cavities in trees, &c. They have many enemies, such as mice and rats, among the mammalia, the swallow and other insectivorous birds among the feathered tribes, and Wasps and Ants among the insects. They are also subject to many diseases. The duration of the life of Bees is not known with certainty. Virgil and Pliny give seven years as the term, and others extend it to ten; but of five hundred Bees which Reaumur marked with red varnish in the month of April, not one was found living in November. By a succession of generations, however, hives have been preserved for upwards of twenty-five years. The honey stored up by the Bees is for their supply in winter or unfavorable weather, and this is more or less exhausted as the winter is mild and open, or the reverse. In severe cold the inhabitants of the hive remain in a state of torpor.

Wax, so valuable to us for many minor purposes, is of still more importance in those parts of Europe and America in which it forms a considerable branch of trade and manufacture as an article of extensive use in the religious ceremonies of the inhabitants. Humboldt informs us that not fewer than 25,000 arrobas, the value of which is upwards of £83,000, are annually exported from Cuba to New Spain, where the quantity consumed in the festivals of the church is immense, even in the smallest villages; and that the total export of the same island in 1803 was not less than 42,670 arrobas, worth upwards of £130,000. Honey, the other well-known product of these insects, has lost much of its importance since the discovery of sugar; but in many inland parts of Europe, where its saccharine substitute is much dearer than with us, few articles of rural economy not of primary importance would be dispensed with more reluctantly. In the Ukraine some of the peasants have four or five hundred Bee-hives, and make more profit of their Bees than their corn. In Spain the number of Bee-hives is said to be incredible; a single parish priest has been known to possess five thousand.

Bees extract honey from most plants, but there are some of which they are particularly fond, such as the Echium, Borago,

Verbascum, Serpyllum, and the Tetradynamia; they are also fond of the *Rhus glabrum* and the *Asclepias Syriaca*, on which they sit without humming. In some countries they attach themselves to particular plants; for instance, in Sweden and the Highlands of Scotland, to the Erica; in Scania, to the Buck-wheat; in Poland, to the Lime-tree; in Narbonne, to the Rosemary; in Greece, to the Thyme; in Corsica, to the Arbutus; in Sardinia, to the Absinthium; in Pontus, to the Aconitum, &c. Hence arise the different flavour and quality of Honey. (*Apis mellifica*, Honey Bee, fig. 67.) The well-known Humble Bees, like the Hive Bees, are social insects, and their societies also consist of three kinds of individuals—males, females, and neuters. They make their nests in or on the ground, some species, such as the *Bombus muscorum*, covering their dwelling with a roof of moss. The solitary Bees usually form their nests by burrowing in the ground or in old posts, &c., dividing the cells by partitions of mud or of masticated vegetable matter. Some species make use of the empty shells of snails for the construction of their nests, and fill up the interior of these with their cells.

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We shall now proceed to the second section, HAUSTELLATA, which comprises those insects with suctorial mouths.

ORDER IX.—LEPIDOPTERA.

The mouth, in this order, is formed of a conical, or subulate labrum, often scarcely perceptible; of two horny, very small, and rudimentary mandibles; two elongated, horny jaws, in the form of tubular filaments, fixed below, as far as the origin of the palpi; with a lip similarly fixed, and uniting by the internal margin, so as to form a trunk, which is rolled up in a spiral form when in a state of repose: the interior of this trunk contains three canals. The maxilliary palpi are two in number, and often indistinct. The lip is one flat and triangular piece, but bears a pair of large palpi, which form the hairy cushions between which the trunk reposes when coiled up. The four wings are covered with very small scales, easily detached, and resembling a fine powder: at the base of each of the upper wings is an appendage, prolonged backwards, which is termed the patagium; the presence of this appendage forms one of the distinctive characters of the order. The wings appear membranaceous and simply veined, when the dust, by which they are covered, is removed. In many species, a portion, more or less large, of the wings is naked and transparent; the scales are fixed by means of a pedicle, with great symmetry, like the tiles

of a roof: their forms are various, very often triangular, with the upper lobe broad and dentated; the colours are equally diversified, and often extremely brilliant. The head is often furnished, in addition to the two ordinary eyes, with two ocelli, placed on each side, near the internal margin of the others. The thorax is formed of three segments, intimately united,—the second, or meso-thorax, being the largest. The scutellum is triangular: the antennæ are composed of numerous joints; in the Diurnæ (or Butterflies which fly by day,) they are always simple, and thickest at the extremity; and in the nocturnal species, the antennæ are filiform, simple, serrated, or pectinated. All the tarsi usually have five joints; and the metamorphosis, in this order, is complete. The females deposit their ova, which are often very numerous, on vegetable substances; upon these, when hatched, the larvæ, which are generally known by the name of Caterpillars, feed: they have six scaly, or hooked feet, and from four to ten membranous ones; the pupa, or chrysalis, is in the form of a mummy, or covered with a coriaceous skin, through which the exterior parts of the animal are distinguished. The bodies of the larvæ are, in general, elongated, almost cylindrical, and variously coloured; sometimes rough, with hairs, or spines, and composed, besides the head, of twelve segments, with nine stigmata on each side; the head is covered with a horny skin.

The *Papilio Machaon* (fig. 74) is black and yellow; hinder wings tailed; edges of the wings black, with yellow crescents; the tips of the hinder ones with a red spot at their inferior tips. In England it is called the Swallow-tailed Butterfly. It is very local, occurring near Bristol, at Beverly, in Yorkshire, and, plentifully, in the fens of Lincolnshire. It is the most superb of all the British species of the Butterfly family.

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The Caterpillar, which is green, banded with black, and marked by a row of red spots, is furnished with a forked, fleshy, protrusible tentacle behind the head; it feeds on the wild carrot, and is found principally in the fens of Lincolnshire and Cambridgeshire. It changes into the chrysalis state in July; and the Butterfly is found throughout August; a previous brood, which appears in May, having lain in a pupa state all the winter.

The wings of the male *Gonepteryx Rhamni* are yellow; those of the female, whitish, with a fulvous spot on each. The Cater-

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pillar feeds on the buckthorn; it is of a green colour, with a darker line along the back; the pupa is gibbous, accuminated before, suspended, in a vertical position, on a perpendicular branch, with a thread of silk wound about its middle, as a support. The Butterfly is found from April to June. When produced in August, it remains during the winter, and appears early in spring (fig. 75).

The wings of the Clouded Yellow Butterfly (*Colias Edusa*, fig. 76), are of an orange colour, with black margins; they are greenish on the under side, with a black spot on the anterior and a silvery spot on the posterior wings. It inhabits Europe, and occurs in England about once in three years; during some seasons only locally, in others in the greatest profusion in every part of the country. There is a pale-coloured variety which has been considered a distinct species.

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Pontia Cratægi (the Black-veined White, fig. 77), has white wings, with a faint tinge of yellow, and black nervures. It inhabits Europe. The Caterpillars are hairy and yellowish; they live, in societies, on the white-thorn. During the winter they are rolled up in dry leaves, and come out early in the spring to feed on the young foliage. About the end of May they go into the pupa state, in which they remain for three weeks, when the perfect insect appears (fig. 78, the chrysalis). To this genus belong the *P. Brassicæ* (the Large White Cabbage Butterfly); *P. Rapæ* (the Small Cabbage Butterfly); *P. Napi* (Green-veined White); *P. Daplidice* (the Bath White), the rarest of this genus, which was first discovered at Bath: it appears, also, to be frequent at Dover. *P. Sinapis* (the Wood White), which is found in woods, also belongs to this genus; and *P. Cardamines* (fig. 79, the Orange-tip Butterfly. Several others have been described as species, which appear to be only varieties.

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The wings of the *Melitæa Euphrosyne* (Pearly Border) are indented, tawny, with black spots on the upper, and nine silvery spots on the under side. It inhabits Europe, and appears only in April. The Caterpillar feeds on the *Viola montana*: it is black

and spiny, with two orange-coloured spots on the back, at each segment. The Butterfly is marked with a black dot at the base of the posterior wings. It appears only in April. *M. Silene* (Pearly Border Likeness) inhabits woods and waste grounds.

M. Cinxia (Glanville) inhabits Europe, but is very rare in Britain. The wings are indented, tawny, and spotted with black; the posterior wings with three whitish fasciæ and black spots. The Caterpillar is blackish and spiny; the lines of spines are, alternately, white and red; it feeds on the *Hieracium pilosella* and Plantain. It is of a very timorous nature, for if the leaf, on which it is feeding, be touched, it immediately quits its hold, curls itself up, and falls to the ground. In May it appears in its perfect state, and is very swift in flight.

M. Artemis (Greasy) inhabits Europe; it is common near Norwich, but is seldom taken near London.

M. Dictynna (Heath) inhabits Europe; the wings are dentated, black, with tawny spots; the posterior wings tawny, with spots at the base; a fascia of spots in the middle, and lamellated yellow spots at the apex. The Caterpillar feeds on heath: it remains fourteen days in the chrysalis state, and in June the Butterfly is found in the open parts of woods, and dry places, in the neighbourhood of heath.

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M. Lucina (Duke of Burgundy Fritillary, fig. 80), inhabits Europe. The wings are indented, brown, with tawny spots; there are two fasciæ, with spots on the under side of the posterior wings. It is among the smaller Butterflies found in the middle of May; it feeds on grasses. The species is not uncommon near Coombe Wood, Surrey.

The wings of *Argynnis Lathonia* (Queen of Spain Fritillary) are indented, yellowish, with black spots, and thirty-seven silvery spots underneath. It inhabits Europe. The Caterpillar is spiny and brownish, with black spots, and a white dorsal line; the pupa is crenated, brown on the fore-part, and greenish behind. The Butterfly is very rare, or, at least its appearance in this country is confined to the hottest summers: it has been taken at Gamblinggay Wood, Cambridgeshire, and also in various parts of Kent.

The wings of *A. Aglaia* (Dark Green Fritillary) are indented, tawny, with black spots, and twenty-one silvery spots below. It inhabits Europe. The Caterpillar is solitary, black, and spiny, with square ferruginous spots on the sides; the pupa is brown. The Butterfly much resembles the following species, but the Caterpillar differs.

The wings of *A. Adippe* (High Brown Fritillary) are indented, tawny, with black spots, and twenty-three silvery spots on the under side. It inhabits Europe. The Caterpillars are cinereous, or brown, with numerous red spines, and a black dorsal line close to a white one; they are produced from the egg, in July, and feed until September, when they spin a fine web, under which they pass the winter, at the root of the *Viola odorata,* or *Viola tricolor;* on which, in spring, they begin to feed, and, early in June, change to brown chrysalides, with silvery dots. They remain three weeks in the chrysalis state; at the end of which their metamorphosis is complete. *Argynnis Paphia* (Silver-washed Fritillary, fig. 81): wings indented, tawny, with black spots and silvery fasciæ below. It inhabits Europe. This is among the largest of the British Butterflies. The Caterpillar feeds on the *Viola canina* and nettle; it is solitary, spinous, and tawny, with a yellow dorsal line; the spines on the neck are longer than the rest: the pupa is gray, contracted at the neck, with six points and four dots, of a gold colour, on the anterior part. The Butterfly, which is swift in flight, appears in June at the sides of woods.

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Ammiralis Atalanta (Red Admirable): wings indented, black with white spots: a red fascia in the upper wings, and another on the margin of the under wings. It inhabits Europe. The Caterpillar is solitary, spinous, and greenish, with a yellowish lateral line: it feeds on the nettle, and draws the leaf close round it, to protect itself against the injuries of the weather and the Ichneumon Fly. As soon as the leaf is exhausted it changes its skin, shifts to another leaf, and webs that together, as the former. When it has grown so large that one leaf will not cover and feed it, it creeps to the top of the nettle, webbing itself up within the leaves, and feeding as before. At the end of July it fastens itself by the tail, within the web, under the nettle-tops, and changes to a chrysalis: the pupa is dentated, blackish, and cinerous, with gilded dots below. In fourteen days after becoming a chrysalis the Butterfly appears: it lives through the winter (fig. 82, *Ammiralis Atalanta*).

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Cynthia Cardui (Painted Lady, fig. 83): the Caterpillar of this interesting species is solitary, brown, and spiny, with yellow, interrupted lines, along the sides. It appears to be confined to thistles,

and is found in July. It remains about three weeks in the chrysalis state: the perfect insect is found in August. An immense swarm of Butterflies, of the species called the Painted Lady (the Belle-Dame of the French, and the *Papilio Cardui* of Linnæus), forming a column of from ten to fifteen feet broad, was, some time since, observed in the district of Grandson, Canton de Vaud. They traversed the country, with great rapidity, from north to south; all flying onward, low, equally, and closely together; and not turning from their course on the approach of other objects. The fact is the more singular, as the Caterpillars of the *Cynthia Cardui* are not gregarious, but solitary from the moment they are hatched. Professor Bonelli, of Turin, however, observed a similar species of Butterflies in the end of the March preceding their appearance at Grandson. Their flight was also directed from north to south, and their numbers were immense. At night the flowers were literally covered with them. Towards the 29th of March their numbers diminished; but even in June a few still continued. They had been traced from Coni, Raconni, Susa, &c. A similar flight of Butterflies, at the end of the last century, is recorded by M. Louch, in the Memoirs of the Academy of Turin. This is one of the few insects that are universally dispersed over the earth; being found in Europe, Asia, Africa, and America.

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Vanessa Antiopa (Camberwell Beauty): wings angulated and black, the borders whitish; inhabits Europe. This species has become exceedingly rare in this country. Mr. Haworth has observed, in the first part of his 'Lepidoptera Britannica,'—"There is something very extraordinary in the periodical, but irregular, appearances of this species, *Papilio Edusa*, and *Papilio Cardui*. They are plentiful all over the kingdom in some years: after which, Antiopa, in particular, will not be seen by any one for eight, ten, or more years, and then appear as plentiful as before. To suppose they come from the Continent is an idle conjecture; because the English specimens are easily distinguished from all others by the superior whiteness of their borders. Perhaps their eggs, in this climate, like the seeds of some vegetables, may occasionally lie dormant for several seasons, and not hatch until some extraordinary, but undiscovered, coincidence awake them into active life."

V. Io (Peacock Butterfly): angulated and indented wings, of a dull red colour, spotted with black, with a blue ocellus on each. It inhabits Europe. The Caterpillars are found on the hop and

the nettle; they are gregarious, set with spines, black with white spots: the hinder feet are ferruginous. They inclose themselves in a web, drawing, at the same time, the leaves together to cover them. They change their colour every time they change their skin, and make a web, each time, at a distance from their former residence. When in their last skin, they forsake the web, and feed separately. The pupa is of a greenish yellow, with ten spines, and bifid behind: it undergoes its change the first week of July, and remains in the pupa state three weeks: the Butterfly then appears.

V. polychloros (Great Tortoise-shell Butterfly): wings angulated, tawny, with black spots; the anterior ones, on the upper side, with four black dots. It inhabits Europe. The Caterpillar is gregarious, spiny, and blackish with a yellow lateral line; it feeds on the elm and fruit trees; the pupa is reddish. The Butterflies appear in July, but the later brood sometimes pass the winter and appear in March. They fly swiftly, and delight to settle in dry pathways and on the trunks of trees, to bask in the sunshine.

V. Urticæ (Small Tortoise-shell Butterfly): wings angulated and tawny, with black spots; the anterior ones, on the upper side, with three black dots. It inhabits Europe. The Caterpillar is gregarious, spiny, and dark coloured, sometimes with a tinge of green; the head is black: it feeds on the nettle. The chrysalis is brownish, with spines and gold-coloured spots at the neck, and sometimes altogether gilded. They may be found in June, hanging by the tail, attached to the leaves or stalks of the nettle. The Butterfly is very common; it lives through the winter, and comes abroad, on some fine day, early in the spring; whence Linnæus calls it *fallax veris indicium.*

Comma C-album (White C Butterfly): wings angulated and tawny, with black spots; the posterior one marked, on the under side, with a white C. It inhabits Europe. The Caterpillar is spiny and tawny, the back yellow before and white behind; the pupa is reddish, contracted in the middle, with gilded points; it is found on the nettle, the hop, the willow, and the currant. The Butterfly is seen from June to September.

Apatura Iris (Purple Emperor, fig. 84): wings indented, brownish, shining with blue or purple, on both surfaces a whitish interrupted fascia, and a single ocellus—or eye-like marking—on the under wing. The following account is given of this interesting and elegant insect, by Mr. Haworth: "In the month of July he makes his appearance in the winged state; and invariably fixes his throne upon the summit of a lofty oak; from the utmost sprigs of which, on sunny days, he performs his

aërial excursions, and in these ascends to a much greater elevation than any other insect I have ever seen, sometimes mounting higher than the eye can follow, especially if he happen to quarrel with another Emperor, the monarch of some neighbouring oak: they never meet without a battle, flying upward all the while, and combating with each other as much as possible; after which, they will frequently return again to the identical sprigs whence they ascended. The wings of this fine species are of a stronger texture than those of any other in Britain, and more calculated for that gay and powerful flight which is so much admired by entomologists. The Purple Emperor commences his aërial movements from ten to twelve o'clock in the morning, but does not perform his loftiest flights till noon; decreasing them after this hour, until he quite ceases to fly, about four in the afternoon: thus emulating the motions of that source of all his strength, the sun. The females, like those of many other species, are very rarely seen on the wing, the reason of which is both interesting and but little known; it is their being destitute of a certain spiral socket, which the males possess, near the base of the main tendon of their upper wings, which socket receives and works a strong elastic spring arising from the base of the under wings, thereby enabling them to perform a stronger, longer, and more easy flight than it is possible for the females to do. The males usually fly very high, and are only to be taken by a bag-net fixed to the end of a rod twenty or thirty feet long. There have been instances, though very rare, of their settling on the ground, near puddles of water, and being taken there. When the Purple Emperor is within reach, no fly is more easily taken, for he is so very bold and fearless that he will not move from his settling place until you quite push him off: you may even tip the ends of his wings, and be suffered to strike again."

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Limenitis Camilla (White Admirable) is a beautiful species, which has become rare near London, but is occasionally found in Suffolk: it is remarkable for its elegant flight (fig. 85).

Of the genus *Hipparchia*, we appear to have about sixteen species; many of them are very local, most of them are of a brown colour, with small ocelli, or eye-like markings; the

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most variegated is *H. Galathea* (fig. 86), which is found in woods during the month of July.

Thecla Quercus (Purple Hair Streak), inhabits woods in June and July. The Caterpillar feeds on the oak, and may be found towards the end of May (fig. 87).

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Lycæna.—The insects of this group may be divided into two sections—the blues and the coppers; the latter are remarkable for their splendid metallic colours; only four species have yet been found in this country. *L. dispar* (the Large Copper) is found in the fens of Huntingdonshire. *L. Phlæas* (the Small Copper, fig. 88) is found on heaths. *L. Corydon* (the Chalk Hill Blue, fig. 89) is confined to chalky districts, and is one of the largest and richest of the species.

Hesperia.—Of this curious genus we have but a few species; they inhabit the skirts of woods and banks; they fly swiftly, but to a very short distance, then alight for a time, again fly a few yards, and very often settle again upon the same leaf or flower; from this circumstance they are termed Skippers (fig. 90, the *Hesperia alveolus*, Grizzle Skipper).

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Sphingidæ.—Some of the species of this family are among the largest of Lepidopterous insects (*Sphinx ligustri*, Privet Hawk Moth, fig. 91).

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They fly, for the most part, early in the morning and late in the evening, except the small species (the *Sesiæ*), which appear during the day. The upper wings are longer and narrower, and the under wings shorter, than those of the Butterflies. They hover about flowers, and, without settling on them, suck the nectarious juices with their long spiral tongue. The Caterpillars are large, smooth, without hairs, and dotted; they have sixteen feet; nine spiracula on each side, and an erect, rigid, acute horn, on the eleventh segment. They change into a chrysalis either under leaves or under the earth, where they make, sometimes an ample web, and sometimes a firm case. The pupa is elongated, and generally continues through the winter before the perfect insect appears. Many of them fly with great rapidity and make a noise with their wings. The Caterpillar of the *Sphinx ligustri* (Privet Hawk Moth, fig. 91) feeds on the privet, the lilac, the ash, the alder, and the willow; it is of a green colour, with oblique, lateral, red striæ before, and whitish behind. When at rest, it keeps the fore part of the body erect, with the feet elevated. It goes into the earth in August, to change into the chrysalis state, and the Moth appears in June. The pupa is brown, with four dents at the tail.

The Death's-head Moth (*Acherontia Atropos*) is one of the largest species, sometimes measuring upwards of five inches across the wings. It is remarkable for its funereal appearance, its colouring being a curious mixture of blackish brown and orange, whilst upon the back of the thorax we find a large orange patch, spotted with black so as to resemble the front of a human skull, whence its English name is derived. The Caterpillar, which is yellow, with blue bands on the hinder segments, feeds principally on the potato; and the chrysalids are often dug up in potato-fields. This Moth is also remarkable for its squeaking when touched, and from this circumstance, and the singular marking of the thorax, it has commonly been regarded as an insect of ill omen in almost all countries.

Macroglossa. The Caterpillar of the Humming-bird Hawk Moth (*M. Stellatarum*, fig. 92) feeds on the stellated plants: it is tailed, and dotted with white; the tail is subulated and blue, the apex ferruginous; the pupa is brown. The perfect insect is not uncommon. By the motion of its wings, when flying, it produces a sound like that made by a Bee or Wasp. It flies rapidly from flower to flower, and, without settling, inserts its long tongue into them to suck their juices. The fly is found from April to September, in gardens and lanes, near woods.

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Sesia tipuliformis (fig. 93, the Currant Hawk) is a small species found on the currant in June. The Caterpillar feeds on the pith: it is solitary, somewhat hairy, and whitish; the head and feet are yellow, with a long line down the back of a darker colour.

Zygæna.—The Caterpillar of *Z. Filipendulæ* (the Burnet Hawk) is found on the rag-wort and other plants; it is of a sulphur colour, with four lines of black dots. The pupa is brown, yellow in the middle, with brown stigmata; it is inclosed in a yellow case, fixed to the stem of some plant. The perfect insect appears in June; it flies heavily, and is easily caught. Its fore wings are blue with six red spots, and the hinder ones red, with a narrow, dark-blue margin, (fig. 94, the cocoon; fig. 95, the perfect insect).

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Bombycidæ.—*Hepialus Humuli* (the Ghost Moth): wings yellow, striated with orange; those of the male white. It inhabits Europe, The Caterpillar feeds on the roots of the hop and burdock: it is of a cream colour, and somewhat glossy; the head is nut-brown; on the back, close behind the head, is a brown, shining mark, of a hard, callous substance. It changes, in May, to a dark-brown pupa, and the moth appears in June. It flies in the dusk of the evening, hovering up and down, in one particular spot, for a long time. It is often seen in churchyards, whence its English name (fig. 96, the female).

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Cossus.—The Caterpillar of the only British species, *C. ligniperda* (Goat Moth), which is one of our largest Moths, feeds on the wood of the birch, oak, and willow; it is of a reddish colour, the head is black: it lives in this state three years, before its transformation to a pupa; when full-fed, it is four inches long. It makes a case composed of bits of wood and saw-dust, which it unites with a strong web, lined in the inside with a fine white filmy substance, like satin. It remains in the pupa state two months; and at the

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end of June the perfect insect may be found on willow-trees (fig. 97).

Saturnia.—The Caterpillars of that elegant insect, *S. pavonia minor* (Emperor Moth), are gregarious, green and verticillated with hairy, red, and yellow warts on a black band; they are found on the bramble and dog-rose. About the middle of July they spin a strong silken case, somewhat of the shape of a Florence flask without the neck; and having inclosed themselves, they change into blackish pupæ, and thus remain till the month of April, when the mouth of the case, being elastic, yields to the effort of its tenant to get out, and the perfect insect appears (fig. 98, the male).

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Bombyx.—The species, *B. mori*, of which the Caterpillar is known by the name of the Silkworm (fig. 99, the male), is said to have come, originally, from the northern provinces of China; and, before the introduction of the animal into Europe, the silk, which is produced from its cocoon, was sold for more than its weight in gold. The city of Turfan, in Bucharia, the metropolis of the Seres, the Serica of Ptolemy, was, for a long period, the principal rendezvous and depôt of the silk-merchants of China. Expelled from their country by the Huns, this people established themselves in Great Bucharia and India; and it is related, that the Greek missionaries, in the reign of the Emperor Justinian, transported the ova of the Silkworm in reeds, for the first time, to Constantinople. The cultivation of this useful animal was thus extended to Southern Europe; and was afterwards introduced into Spain and Africa by the Arabs. In the time of the Crusaders, the insect passed from the Morea into Sicily and Calabria. From Calabria, the mulberry, and the ova of the same animal, were brought to France by some of the followers of Charles the Eighth, on his conquest of Naples; and the cultivation of the insect was afterwards encouraged and patronised by Sully, as an important branch of national industry. The mode of feeding and managing the Caterpillar, or Silkworm, and procuring its delicate web, is detailed in numerous works, both scientific and economical. The Caterpillar feeds upon the leaves of the black or white mulberry, the latter being preferred; it thrives well in this country, also, on lettuce-leaves. After remaining in this state for about six weeks, during which the Caterpillar changes its skin six times, the animal ceases to feed, and begins to form an envelope, or cocoon, of silken fibres, in some convenient

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spot, producing minute threads until it has formed an oval yellow case, or ball, about the size of a pigeon's egg, in which it changes to a chrysalis. In this state it remains about fifteen days, when the perfect insect is produced. This, however, is not allowed to happen when Silkworms are reared for the sake of the silk; the cocoons are, therefore, exposed to such a degree of heat as to kill the inclosed animals; a few only being saved to keep up the breed. The Moth, when produced, is but very short-lived. The length of the silken thread, when unrolled, is said to be from three hundred to five hundred yards, and it is composed of two united threads, or filaments, agglutinated together. The manufacture of silk goods from this humble but beautiful material, has been known from very early times. The general use of silk in Europe, however, boasts of no great antiquity. Henry the Second of France is said to have been the first individual who had stockings of this manufacture. Queen Elizabeth first added black silk stockings to the royal wardrobe; and James the Sixth of Scotland, before his accession to the English crown, wrote to the Earl of Mar for the loan of a pair of stockings of the same material, to appear with dignity before the English ambassadors. Towards the end of this King's reign, however, the broad-silk manufacture was prosecuted, in England, to a considerable extent; and in 1661 the silk-throwsters, of London, employed four thousand persons. The manufacture of silk goods is now an important branch of British industry.

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Noctuidæ.—The Caterpillar of *Catocala nupta* (Red Underwing Moth, fig. 100) is naked and gray, with a truncated wart upon the tail; it feeds on the willow, and is found in June and July. It spins a case, in which it turns to a bluish pupa. The Moth is found in August and September.

The *Geometridæ* have slender bodies and large wings, so that they somewhat resemble Butterflies in their appearance; they are remarkable for the mode of walking adopted by their Caterpillars. In these there are only two pairs of prolegs, placed close together at the hinder extremity of the body; the Caterpillars in walking adhere alternately by these and the true legs, drawing up the middle of the body into a loop at each step. Hence the name of *Loopers* often given to these Caterpillars; the term *Geometers* also alludes to their thus apparently measuring the space they pass over.

Tineidæ.—*Hyponomeuta padella* (the Ermine, fig. 101) inhabits

the white-thorn and apple-trees; it feeds on the leaves, and whole hedges may frequently be observed entirely destroyed by the Caterpillar. This species has been directed in the larva state, by Mr. Habenstreit, of Munich, so as to work on a paper model suspended from the ceiling of a room. To this model he can give any form and dimensions; and he has thus been enabled to obtain square shawls, an air-balloon four feet high, and a woman's complete robe with the sleeves, but without seams. One or two larvæ can weave a square inch of cloth; a great number are, of course, employed, and their motions are interdicted from the parts of the model not to be covered, by applying oil to those parts. The cloth exceeds in fineness the lightest gauze, and has been worn, as a robe, over her court dress, by the Queen of Bavaria.

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This family also includes the well-known Clothes Moths (*Tinea pellionella*) so destructive to woollen cloth, furs, and similar animal substances. The larva of the Clothes Moth makes itself a little coat of a portion of the substance on which it feeds, and this it increases to keep pace with its growth in a most ingenious manner, by ripping up its case and inserting new breadths and end pieces. When the Caterpillar is moved from time to time upon cloths of different colours, its coat becomes striped in consequence of these additions.

ORDER X.—DIPTERA.

This order contains those insects that have but two wings; the Common House Fly, the Carrion Fly, &c., belong to it. Few insects of this orders are better known than the Gnat; and there are not many that afford a more interesting history. From the beginning of May their larvæ may be seen in the stagnant waters, with their heads downward. From the side of the abdomen arises the hollow tube through which they respire; their heads are armed with hooks, by which they seize on such insects as constitute their food. These larvæ retain their form during a fortnight, or three weeks, after which they turn into chrysalids; and all the parts of the winged insect are then distinguishable through their thin exterior covering; an alteration, also, takes place in the situation and shape of the respiratory tube; in this state it is divided into two parts and placed near the head. The chrysalids abstain from eating, and reside almost constantly on the surface of the water; but the least motion causes them to unroll themselves from their spiral position, and by means of the paddles on their hinder part, to plunge to the bottom. In the course of a few days they are transformed into

perfect Gnats. If, at the instant of the change, a breeze spring up, the consequences to them are fatal, as the water gets into their cases, from which they are not yet perfectly loosened; this immediately sinks them, and they are drowned. The female deposits her eggs on the surface of the water, and surrounds them with a kind of unctuous matter, which prevents them from sinking; at the same time uniting them side by side, so as to form them into a little concave raft or boat, which floats freely on the surface of the water. Here the eggs remain until the young are hatched. If the Gnats were not devoured by fish, water-fowl, swallows, and other animals, the air would often, from their immense multitudes, become darkened; a few instances have occurred in which this has been the case (fig. 102, *Culex pipiens*, the Common Gnat).

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It is impossible to behold and not admire the beautiful structure of the proboscis of the Gnat, through which it draws the juices that afford it nourishment. The naked eye is only able to discover a long and slender tube, containing five or six spicula of exquisite fineness. These spicula introduced into the veins of animals, act like the suckers of a pump, and cause the blood to ascend. The insect injects a small quantity of liquid into the wound, by which the blood is made more fluid. It soon begins to swell and grow red, but does not quit its hold till it has gorged itself. The liquor it has injected causes a disagreeable itching, which may be removed by volatile alkali, or by immediately rubbing and washing the place with cold water. We are also told, that rubbing the part affected with fuller's-earth and water, or chalk and water, will lessen the inflammation.

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Œstridæ.— The larvæ of the Ox Bot (*Œstrus Bovis*) live in the backs of oxen and other cattle, causing subcutaneous tubercles or knobs; they grow to be as large as the end of the finger, and may be squeezed out at a hole they have always open; they are round, rough, and of a dirty-white colour (fig 103, the perfect insect, *Œstrus Bovis*, the Ox Bot).

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The family *Hippoboscidæ* contains the Forest Fly and the Sheep and Swallow Ticks. The Forest Fly, we believe, is confined to the New Forest of Hampshire; these insects cling to the flanks of the horse in swarms, so that several handfuls may actually, at times, be taken from a single animal (fig. 104, the Forest Fly).

ORDER XI.—APHANIPTERA.

The best example of this order is the Common Flea. When examined with a microscope, it will be observed to have a small head, large eyes, and two four-jointed palpi, between which the sucking organs and lancets of the mouth project. The antennæ are minute, and concealed in small cavities behind the eyes. The body is enveloped in a shelly armour that is always clear and bright; this is beset on each segment with many sharp bristles. All its motions indicate agility; and its muscular power is so extraordinary, as justly to excite our wonder. We know no other animal whatever, whose strength, in proportion to its size, can be put in competition with that of a Flea; for, on a moderate computation, it is able to leap to a distance of at least two hundred times its own length; it will drag after it a chain a hundred times heavier than itself; and, to compensate for this force, will eat ten times its own weight of provisions in a day. Mr. Boverich, an ingenious watch-maker, who some years ago lived in the Strand, exhibited a little ivory chaise with four wheels, and all its proper apparatus, and a man sitting on the box, all of which were drawn by a single Flea. He made a small landau, which opened and shut by springs, with six horses harnessed to it, a coachman sitting on the box, and a dog between his legs, four persons in the carriage, two footmen behind it, and a postilion riding on one of the horses, all of which a Flea drew with ease. He likewise had a chain of brass, about two inches long, containing two hundred links, with a hook at one end and a padlock and key at the other, which the Flea drew very nimbly along.

The larva of the Flea is a worm-like, footless grub, with a horny head, which usually lives in dusty places on the floor. When full grown it incloses itself in a small silken cocoon, within which it undergoes its transformations.

ORDER XII.—HEMIPTERA.

The Cimices, or Bugs; the Nepa, or Water Scorpion; the Notonectæ, or Boat Flies; and the Cuckoo Spits and Aphides, are insects of this order.

Cimex lectularius (the Bed Bug), though now too common and well known in this country, was formerly a rare insect here. Had it not been so, two noble ladies, mentioned by Mouffet, would scarcely have been thrown into violent agitation and alarm by the appearance of bug-bites upon them; which, until their fears were dispelled by their physician, who happened to be a naturalist,

they considered to be nothing less than symptoms of the plague. Being shown the living cause of their fright, their fears gave place to mirth.

Pentatoma prasina (fig. 105) inhabits the oak, hazel and white-thorn, during the autumn months; and *Coreus marginatus* is found in hedges in May and June.

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The Water Scorpion (*Nepa cinerea*, fig. 106) inhabits ponds and ditches, and is of a most savage disposition, seeming to love destruction for its own sake. Mr. Kirby says, that one which was put into a basin of water with several young Tadpoles, killed them all without attempting to eat one.

The common Boat Fly (*Notonecta glauca*, fig. 107) swims on its back; it may be found in most ponds; the posterior feet are fringed, and well adapted to the water. This insect is capable of thrusting its rostrum into the hand, and causing a pain similar to the insertion of a hot needle, but which passes off in a few minutes.

In all the preceding Hemipterous insects the upper wings or elytra are apparently divided into two parts, of which the basal is horny or leathery, and the apical membranous. In the remainder of the order the upper wings are of the same texture throughout, and these insects are consequently called HOMOPTERA by some authors.

The larvæ of the *Aphrophora spumaria* are well known as discharging from their bodies, upon the branches and leaves of plants, a kind of frothy matter, called by the country people in many parts of England Cuckoo-spit. In the midst of this they constantly reside, probably for shelter against the rapacity of such stronger insects as would otherwise prey upon them. Nature seems to have afforded them this kind of defence, as their naked and soft bodies might otherwise be very easily injured; perhaps, also, the moisture of this foam may serve to screen them from the sultry beams of the sun. When uncovered, the insect soon emits fresh foam, which again hides it from observation. In this the

larva goes through its metamorphosis to a pupa and a winged insect; as any person who is careful enough to watch when the froth begins to subside a little may perceive. For this purpose, the insect with its leaf must be placed under a glass. The froth, degenerating to a white film, fixes the creature to the leaf; the fly may soon after be seen, first putting out its head, and then, by degrees, its body. When the fore part is out, a small protuberance will be perceptible on each side, which, every moment growing larger, will soon appear to be the wings of the fly gradually unfolding themselves. The whole change is usually completed in about a quarter of an hour; the fly then extends its wings over its body, and entirely quits the fine silver-like case of the larva, with all its legs and other apparatus. The perfect insect is of a brown colour, and has on the upper wings two lateral whitish spots. It is very common in meadows and pastures, and is so agile, that, when in danger of being caught, it will sometimes spring to the distance of two or three feet (fig. 108).

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One of the most elegant British insects of the order is the *Cercopis sanguinolenta* (fig. 109), which is found in woods during the month of June. Many of the Cicadæ are very large, more especially those of hot climates. We are indebted to Mr. D. Bydder for the discovery, in this country, of a small species of this family (*Cicada hæmatodes*, fig. 110), which was found by that gentleman in the New Forest, Hampshire. In South America and New Holland the species are generally denominated Razor-grinders, from their harsh discordant sounds; and in North America there is one species (*Cicada septendecim*) that appears in profusion once in seventeen years, and makes such a continual din from morning to evening, that people cannot hear each other speak. The noise made is peculiar to the male insect, and is produced by a pair of peculiar drums, concealed by two large plates of an ovate form, covering the anterior part of the belly, and fixed to the trunk between the abdomen and the hind legs.

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The insects of the genus *Aphis* are small and defenceless, but very noxious: their history and manners are most remarkable. There are many species of the genus which, for the most part, inhabit particular plants; attaching themselves, generally, to the young twigs, the foot-stalks or leaves, and exhausting the juices, by which means these parts, especially the leaves, are deformed and destroyed. Most plants have their peculiar Aphides; but

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some species are not restricted to a single sort, but prey on several. They are commonly called *blights* by gardeners. Their fecundity is astonishing,—every individual met with during the summer producing living young, which are capable of giving birth to other similar insects in the course of about three weeks. Hence the progeny of a single Aphis, in the course of the summer months, may be calculated to exceed in number all the human inhabitants of the earth; but in a state of nature this can never be the case, as many causes are constantly in action to restrain this multiplication within due bounds.

REARING OF CATERPILLARS.

As the rearing and management of Caterpillars may prove interesting, before we conclude we shall detail the most successful methods that can be adopted for that purpose.

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Breeding-cages are used for rearing insects from Caterpillars, and may be made of wainscot (deal is objectionable, as the scent from the turpentine is liable to kill the larvæ), in the form represented by fig. 112, with the sides and front covered with gauze. A small square box should be placed in it for the reception of a phial of water, in which the stalks of the plants may be put for the Caterpillars to feed on. The most convenient size of the cage is about eight inches in breadth, four in depth, and one foot in height; it should contain one kind of Caterpillar only, as some species devour others, and indeed, if left without food, they will even devour those of their own kind. At the bottom of each cage a quantity of earth should be placed, about two inches deep, mixed with a little sand, and some of the fine mould frequently found in the bodies of old trees, to prevent the earth drying up into hard lumps or clods. The cages should be placed in a cool and moist place, as in a cellar or out-house; for a great number of Caterpillars change into the pupa state several inches beneath the surface of the earth, and, if kept too dry, the earth about them will absorb the nutritive moisture from the animal, thereby not only weakening it, but hardening the shell in which it is inclosed; so that its strength will be insufficient to burst the case when it should come forth in its perfect state.

As some years produce a greater quantity of Caterpillars than

others, and keeping each kind by themselves would not only require an immense number of cages, but much time to change the food and pay a proper attention to them, it is a common practice to have a breeding-cage of much larger dimensions, so that a great number of Caterpillars may be fed in one cage, in which a variety of food may be kept; it should, however, be taken away, and the cage replenished with fresh plants every second or third day, in order to obtain fine specimens of the perfect insects.

Single Caterpillars, or the Caterpillars of small species, such as the *Tineidæ*, may be kept in small glass jars, or in little pots, loosely covered with a glass plate, by which means the transformations of a great number of species may be conveniently observed, without their occupying too much space.

For the mode of arranging, preparing, and preserving insects, much valuable information may be derived from a perusal of Westwood's 'Modern Classification of Insects;' for an intimate knowledge of the habits and forms of the insect world, Kirby's 'Bridgewater Treatise,' edited by Rymer Jones, and especially Messrs. Kirby and Spence's admirable and interesting 'Introduction to Entomology;' and for general information in a popular form, richly illustrated with coloured plates, we can safely recommend the seven volumes of Insects in Jardine's Naturalists' Library.

THE AVIARY.

Th' affrighted Dove, by a fell Hawk pursued,
For safety flew to thee, but found it not;
She, hapless, was again cast forth, and died;—
Thou, ruthless man! no more shalt be a judge.

ACCUSTOMED as our readers must be to the beautiful forms and plumage of many varieties of birds, they will, doubtless, feel an inclination, not merely to possess some knowledge of the proper mode of treating those which are usually kept in the Aviary, but also to acquire an idea of the natural history of so interesting a class of the animal kingdom, as that to which they belong. In some degree to satisfy so laudable a desire, will be our object throughout the present article.

Birds considerably exceed quadrupeds in point of number, but fall short of them in size. The Ostrich, which is the largest bird known, is much less than many quadrupeds, and the smallest of these is larger than the Humming-bird. All birds are oviparous; producing eggs, from which the young are subsequently hatched: they are very often long-lived, and dispersed over the greater part of the earth. To man, birds are exceedingly useful, although but few species have been domesticated: the flesh of many of them affords us delicious food, and the plumage of others is rendered valuable by its application to a variety of purposes.

The bony frame in birds is much lighter than in quadrupeds: the cavities are larger, and it is altogether well calculated for the purpose of flight. The strong ridge down the middle of the breast-bone is adapted for the attachment of those powerful muscles by which the wings are moved. The breast-bone is very large; the neck long and flexible; and the spine immoveable. The bones of the legs are analogous to those of the hind legs of quadrupeds, and those of the wings to their anterior limbs: the former terminate usually in four toes,—three of which are placed before, and one behind. Some birds have only three toes, and a few but two: and their position varies considerably in different individuals. The termination of the wings is in three joints only; the outer one of which is very short.

The crop and gizzard are important parts of birds; the former is a membranaceous bag, which softens and prepares the dry food for the gizzard, into which it afterward passes, and where, by means of two very powerful muscles, and a number of hard substances which birds swallow, and which are retained in the gizzard for this purpose, the aliment is forcibly ground. In the Rapacious Birds the gizzard is wanting; their stomachs being similar to those of quadrupeds.

To whatever bird we may turn our attention, we shall find that it is furnished with a beak nicely adapted for its food and manner of feeding: and that there is often a marked affinity between the beak and the foot. The celebrated Cuvier observes, that we never meet with the sharp talons of the Eagle accompanying the flattened beak of the Swan. The birds which are mounted upon long stilt-like legs have either long necks or long bills, and sometimes both, to enable them to reach their food without difficulty:—the powerful legs and claws of the Rapacious order enable the birds to seize their prey and assist them in tearing it;—the claws of the Woodpecker, which, by means of its hard bill and long barbed tongue, is enabled to open clefts, and extract the insects which it eats, are so well adapted to its habits, that the young ones can climb up and down the trees before they are able to fly.

The sight of birds, especially those of the Rapacious kind, is very acute: they possess the power of accommodating the eye to the various distances of objects, so as to see clearly such as are a great way off, and also those which are close to them. They derive this power, it is supposed, from a singular arrangement of scales round the iris, which enables them to elongate or shorten the axis of the eye, according to circumstances. (Fig. 1, eye of the Owl; *a*, the iris, &c., very prominent; *b*, a series of bony plates, or scales, which slide over each other, and allow of an alte-

ration in the axis of the eye; *c*, a portion of a square muscle,

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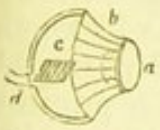

which draws down the crystalline lens, designated by a dotted line, and thus alters the focus of sight; *d*, the optic nerve.) It has been stated, on good authority, that within a short time after an animal has been killed, when not a speck was previously seen in the heavens, Vultures, in great numbers, have appeared approaching from immense distances towards the carcase, although not the least odour from putrefaction was perceptible. Similar facts are related, accompanied by such circumstances as have led authors to believe, that the powers of scent, in some Rapacious Birds, are even greater than those of vision.

Birds also possess the sense of hearing in great perfection. They have no external appendages to the ear, except feathers; that of the Owl is remarkably large (fig. 2). Connected with the

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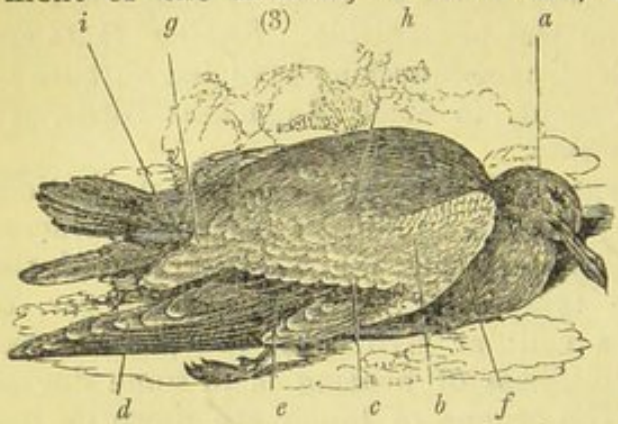
cavity of the tympanum, or drum of the ear, of this bird, is a cellular structure, to which its extraordinary acuteness of hearing is in some degree attributed. The organs of touch are more or less delicate in different birds. It is worthy of remark, that the bills of Ducks, Geese, and others of similar habits, are covered with a delicate membrane, so abundantly supplied with nerves, as to enable the birds to discover the food they seek beneath the surface of the mud.

The plumage of birds is no less admirable for its nice adaptation to their necessities and manner of living, than for its richness and variety of colour. The feathers next the skin are furnished with a sort of down, which keeps the body of the bird warm; the exterior ones are neatly folded over each other, tending in the same direction, and calculated, by their formation, to ensure speed, as well as to keep out the wet and cold. Certain glands upon the hinder part of the back afford a quantity of oil, which the bird presses out with its bill, and rubs over its plumage to smooth, and render it capable of affording a greater resistance to water. The Aquatic Birds have a more bountiful supply of this oil than those which live on land. The exterior feathers have a series of filaments regularly arranged on each side, forming two beards;—the filaments of one being longer than those of the other; the edges on both sides are perfectly even, and neatly tapered off, by all the filaments decreasing to a point at their extremities. If the filaments of any feather, which has not been too much damaged, be separated from each other, so as to stand completely upright, and the feather be then drawn lightly a few times through the finger and thumb, from the quill upward, all the filaments will unite again, and recover their smooth and entire surface; so, when the

bird's plumage gets ruffled, it is enabled to restore each feather to its proper state, by bringing the filaments together through the mandibles of its bill; the edges of the filaments being furnished with hooks, by means of which each locks itself fast to its neighbour. The shaft of the feather is light in its construction, slightly arched, of a material and size sufficiently strong for the purposes to which it is devoted, and lined with a soft pulp for the nourishment of the laminæ, or filaments, of which they are composed.



The names and situations of the principal feathers of birds are as follow (fig. 3): *a*, the auriculars; *b*, the lesser coverts of the wings; *c*, the greater coverts; *d*, the primaries, which spring from the first bone of the wing; *e*, the secondaries, which spring from the second bone of the wing; *f*, the four or five feathers which constitute the bastard wing; *g*, the tertials; *h*, the scapulars; *i*, the tail coverts: the under coverts clothe the insides of the wings.

The bones of a bird are hollow, and admit air from the lungs into the cavities: thus the specific gravity of the body is decreased, and the bird is better able to sustain itself on the wing. A number of air-bags, or cells, which communicate with the lungs, and run the whole length of the body, tend materially to the same effect: by means of these air-bags, which birds are enabled to fill or empty at pleasure, they can increase or diminish their specific gravity, more or less, as may be most expedient, in the various actions of diving (if water-birds), soaring from the earth, or alighting upon it. Air-cells also extend along the muscles; and these, in such birds as are most remarkable for their power of flight, are particularly large. Even the barrels of the quills are hollow and contain air; so that a bird may be said to bear some resemblance to an inflated balloon. Its air-cells, &c., render it so buoyant, that the body is indebted for but little support to the wings, which are therefore left, in a great measure, free, to increase the speed or direct the course. The addition to its specific gravity, obtained by compressing the body, so as to expel the air from the cells, enables the bird, if Aquatic, to descend rapidly from the surface of the water; or, if Rapacious, to pounce with greater velocity, from its usual elevation, upon its prey beneath. The wings are placed in the most advantageous situation for the purpose of flight; the pectoral muscles, which are chiefly concerned in putting them in motion, are much stronger than in other animals.

The power of the wings decreases, by almost imperceptible gradations, through different tribes, until, at length, the faculty of flying ceases altogether. While a few of the quadrupeds are endowed with wings which enable them to soar aloft from the earth, there are birds whose puny pinions will not support them for an instant in the air. Some possess the power of running with astonishing swiftness, others are capable of swimming with different degrees of facility, a few can neither run nor fly;—but to these, Nature has not been altogether a niggard; for where the Ostrich could not wade, nor the Eagle swim, the Penguin—whose feet Buffon describes as resembling two broad oars, so situated as to render the bird exceedingly well qualified for its manner of living—floats in perfect security.

NIDIFICATION.

In the early part of spring most birds seek out mates, to which they attach themselves during the remainder of the season. Their first care is to select a proper place for building the nest; and, it is worthy of remark, that the little surveyors always fix upon a location admirably adapted to their habits, and the shape, strength, and materials of the nest they are about to build: it is almost invariably similar to the places chosen for the like purpose by all the birds of the same species, as well now as heretofore.

The nests of birds are as various in form and material as location. Concealment from their natural enemies is a great object during incubation; this they are taught by instinct, and by this are their labours governed: thus, the bird that builds its nest in the cleft of a tree, often coats it with the lichen which grows on the bark of the adjoining branch; the twigs, of which a Ring Dove's is composed, appear, at a cursory view, to be dead portions of the bough on which it is built; the Linnet's is nearly of the same colour as the furze-bush wherein it is concealed; and the Wren's looks like a heap of moss at the foot of a tree, or by the bank side, where it is built.

Many birds merely select a hole in a tree, bank, rock, or old wall, which they line with some soft substance; others choose similar places, without making any addition for the warmth of their eggs, or the comfort of their young ones; some, again, excavate holes for their nests with their bills; and other species take possession of holes made in this manner, which have been deserted by the birds that made them. Those birds which do not mate are careless as to the construction of the nest; and several hens frequently lay in the same. The smaller tribes of birds are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more expert in nidification than those of a larger growth. Among others, the nest of the Tailor-bird is very remarkable. It is constructed of one or two leaves, dexterously sewn together by a slender vegetable filament; and the interior is filled up with cotton (fig. 4). But the Cuckoo,—sweet harbinger of soft airs, herald of sunny mornings, the poet's pet, the schoolboy's delight,—that mysterious voice which, like echo, to him seems bodyless,—for though its monotonous melody is often heard, it is but rarely seen, and, if seen, as rarely known to be a Cuckoo by its beholder;—divested of the toils and joys which other birds experience, neither builds a nest, nor hatches nor rears its offspring; the process of nidification, as well as that of incubation, is performed for her by the Hedge-sparrow, the Titlark, the Yellow-hammer, or some other small bird. Leading a life of lazy luxury, all her occupation seems to be, making the meadows merry with her joyful note. She selects a nest which suits her fancy, generally a Hedge-sparrow's, and, while the owner is on the wing, contrives to drop her egg unperceived, and then, leaving it to the care of the nurse whom she has selected, never visits it again.

INCUBATION.

Shortly after the nest is completed, the female bird lays her eggs in it; and the process of incubation, or sitting, is commenced when she has deposited the number usually laid by birds of her species. The eggs of birds are all nearly of the same form, but they differ in colour as well as size. The stronger, or more rapacious birds, lay a less number of eggs than those which have numerous or powerful enemies, and are not endowed with the means of entering into an equal conflict with their adversaries, or destroying other individuals of a lesser rank. By this disposition a sufficient quantity of prey is provided for the rapacious; the number of which, not being subject to much reduction, by the ravages of other creatures, when created, are produced only in such small quantities as not to be destructive to entire species: thus the balance is fairly maintained.

The period of incubation varies with different species of birds: some hatch only once in the year; others, which incubate in a shorter time, have two or three,—and some few, several broods during the season.

The males of many species take no part in the task, but leave the business of incubation entirely to the female: this is the case with most of the birds that do not mate: some of these are even most hostile towards the young when hatched. The males of other species feed the hen while she sits, and a great number share the important task of incubation.

The most timid bird, during the period of sitting, or when rearing its nestlings, seems to have its nature changed: the Common Hen, however timid she may be on other occasions, will carelessly fly out at the dog, or assail that terror of the poultry tribe, the Kite, when encompassed by her beloved brood; and many birds, which are otherwise remarkably shy, will suffer themselves to be lifted off their eggs when sitting. Nature, however, teaches the hen to drive her little ones from her side when they become capable of providing for themselves, in order that she may again recover sufficient vigour to rear a second brood.

MIGRATION.

There is nothing more remarkable in the habits of birds than the regular migrations performed by many species from one country to another: several disappear to go we know not whither, and return we know not whence; but the places of emigration, as well as the time of the departure and re-appearance of a great portion of the birds of passage, are perfectly well known to naturalists. The causes for which they change their places of abode, with the variation of the seasons, are, principally, the alteration of the temperature of the air, and a deficiency of that peculiar sort of food which they prefer during one part of the year, in each of the countries to and from which they migrate.

CLASSIFICATION.

Birds form a distinct class (Aves), which Linnæus divided into six orders: 1. Accipitres (or Predacious). 2. Picæ (or Pies). 3. Anseres (or Web-footed Birds). 4. Grallæ (or Waders). 5. Gallinæ (or Gallinaceous Birds). 6. Passeres (or Birds of the Sparrow kind).

Since the days of Linnæus several different classifications have been proposed by various ornithologists, some of them departing widely from that of the illustrious Swedish naturalist, whilst the majority may be regarded as constituting modifications of the classification proposed by him.

The arrangement which will be adopted in this article is as follows:

1. RAPACIOUS. 3. SCANSORIAL. 5. GALLINACEOUS.
2. PASSERINE. 4. COLUMBINE. 6. STRUTHIOUS.
7. WADERS. 8. SWIMMERS.

We shall now proceed to notice some of the principal families of the several orders.

RAPACIOUS BIRDS.

In this order are arranged the Vultures, Falcons, Eagles, and Owls. They are all of a predacious nature, and their food is entirely animal. Their characters are easily distinguishable; the bill is curved and powerful, on each side towards the end there is a projection, like a tooth; the base is frequently covered with a naked membrane, called a cere (fig. 5, *a*); the legs are short, and the claws sharp-pointed and considerably curved (figs. 5 and 6, head and foot of the Eagle). It is a remarkable fact, that the females of birds of prey, unlike those of the other orders, are rather larger and more powerful than the males.

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Vultures (Vulturidæ).—This is the first family of the Rapacious order. The head and neck, in most of the species, are destitute of feathers, the bill is curved at the tip, the legs are powerful, but the talons are not so formidable in their appearance as those of some of the Eagles and Hawks. (Figs. 7 and 8, head and foot of the Monk Vulture.) Vultures are numerous in the warmer regions of the earth, where they are exceedingly useful in devouring animal remains, which would otherwise infect the air. They have been, aptly enough, termed the Scavengers of Nature in the animal world. In northern climates, where they would be of less utility, they are but rarely found. They generally build their nests in cliffs, which are almost inaccessible to man; the hen lays two eggs, and produces but one brood in the year.

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The most remarkable bird in this genus, is the South American Condor; its wings extend, when spread, to the immense width of

nine or ten feet The Bearded Vulture, or Griffon of the Alps, is nearly as large as the Condor; it has its head and neck clothed with feathers, and thus appears to be intermediate between the Vultures and Eagles.

9

Falcons (Falconidæ).—This family includes all the Eagles, Buzzards, Kites, Hawks, &c. The characters are a sharp, powerful, and hooked beak and claws, and a cere at the base of the bill, in which the nostrils are placed (see figs. 5 and 6). The Falcons may easily be distingushed from the Vultures, by having the head well clothed with feathers (fig. 9, head of Sparrow Hawk). The Golden Eagle (fig. 10) measures three feet in length. The general colour of its plumage is a deep brown, dashed with tawny about the head and neck, and variegated in different parts with darker shades. The cere is of a fine golden hue, and the bill is of a dark brown colour; the legs are feathered, the toes yellow, and the claws black. The Eagle builds in mountainous places, and breeds in the northern parts of this country; its nest is composed of large sticks, rushes, heath, &c. The hen often lays three eggs, but it rarely occurs that more than two are prolific.

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The Buzzards are the most common of all this family of birds in England; they are so indolent in their habits, that they often remain perched on the same branch for many hours together. They feed on all such kinds of young animals as they can catch and overcome, and even occasionally on carrion. The colour of Buzzards varies considerably, even in the same species; the coverts of the wings and the feathers of the head and neck are generally of a deep brown, with palish yellow edges; the throat and breast in some is brown, and in others variegated with spots on a yellow ground. The hen Buzzard frequently takes possession of and repairs a deserted crow's nest; she lays two or three eggs, which are entirely white, or white spotted with yellow.

The Kite (fig. 11) is one of the ignoble class of Predacious birds; possessed of but little courage, it never attacks any bird or animal which is capable of offering much resistance; chickens are

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its favorite prey, but it avoids entering into a conflict with the hen, and rarely attempts to carry off any but such as have strayed to some distance from the parent bird. The Kite is easily distinguished from the Buzzard by its forked tail. In length it rather exceeds two feet; the bill is much hooked and furnished with bristles at the base; the eyes, legs, and cere, are yellow; the claws black; the head and chin are of a light gray colour, streaked with brown; the neck, breast, and tail are reddish; the back is brown, and the coverts of the wings black and white. The female builds in trees, and lays two or three eggs of a whitish colour, spotted with reddish brown.

The true or noble Falcons, in former times, were great favorites with persons of rank in this country; they were trained up for the diversion of falconry, and supported at an immense expense. Even the ladies in those days enjoyed the diversion of hawking; and we frequently find figures of noble dames of by-gone times, sculptured with Hawks on their hands. Many volumes have been written on the mode of training these birds, and fortunes have been spent upon them. In the reign of Edward the Third it was made felony to steal them; and a person who took a Hawk's eggs, even on his own land, was punishable by imprisonment for a year and a day, and a fine at the king's pleasure. In the East the diversion of hawking is still pursued with great zeal by the native princes and nobles.

The Jer-Falcon, the Lanner, the Kestrel, the Merlin, the Hobby, &c., were used in falconry. Of these, the Jer-Falcon was accounted the most intrepid and valuable.

None of the Hawks possess any gaiety of plumage; but some of them are certainly very elegant in their forms. The species best known in this country is probably the Sparrow Hawk (fig. 12), a very bold and courageous bird, which commits great destruction among Pigeons. The female lays four or five eggs, and builds her nest in high trees, or holes in rocks, and sometimes adopts the forsaken nest of a Crow. In the winter, Sparrow Hawks often resort to the roofs and steeples of churches

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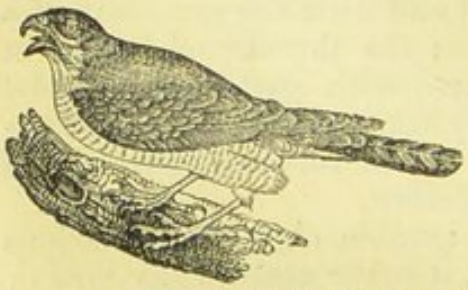

in the metropolis, and commit great havock among the flights of the pigeon-fanciers.

The Harriers, of which three species are found in Britain, are Hawks of moderate size, which, when seeking for their prey, fly slowly along at a small distance from the earth, surveying the surface of the ground as carefully as a dog hunting after game; hence, probably, they have received the name of Harriers. Their prey consists of small quadrupeds, young birds, and even insects, which they usually capture on the ground, but they have sometimes been seen pursuing birds upon the wing. They build their nests upon the ground, amongst heath or furze; the female lays three or four eggs (fig. 13, the Marsh Harrier, or Moor Buzzard).

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The Secretary Bird, which has been by some authors classed with the WADERS, and by others with the GALLINÆ, is now considered to be nearly allied to the Harriers. Its prey consists of snakes and other reptiles, for the destruction of which its form is well adapted; the beak is short, thick, and curved nearly from the base, which is covered with a cere; the legs are long and slender, the toes short, the talons blunt and but slightly curved. These birds are found in the southern parts of Africa; they build their nests in thick bushes, or in lofty trees, and live in pairs like the Eagles (fig. 14, the Secretary).

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Owls (Strigidæ).—In this family, which is the third of the ACCIPITRES, or Rapacious Birds, the bill is hooked, bristled at the base, the claws are strong and curved (figs. 15 and 16, head and foot of the Brown Owl), the tongue is bifid, the eyes, head, and ears large; a circle of soft white feathers surrounds the eyes, which are so formed, that the birds of this genus are capable of pursuing their prey with very little light. Although the greater part of the Owls are nocturnal birds, some species

prey during the day-time; and these, it has been observed, bear a greater resemblance to the Hawks than the rest of the family.

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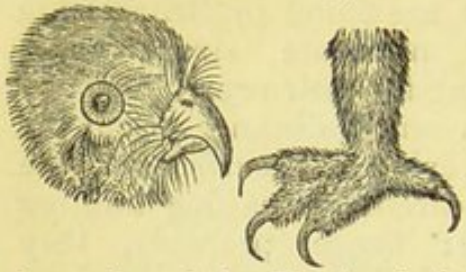

The Owls may be divided into two sections: namely, those with and those without tufts of feathers growing up from the head, like ears or horns. In the former class, the Great Horned Owl, which is sometimes found in England, is most conspicuous; it is the largest of the genus, being nearly equal in size to an Eagle; it builds in rocks or mountains, and feeds on young hares, rabbits, and even pheasants and grouse.

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The Long-eared Owl (fig. 17) is well known in this country. It is about fourteen inches in length; its plumage is marked with various shades of brown, yellow, and cream colour; the legs and feet are covered with feathers. It inhabits ruined buildings and hollow trees, and the hen lays four or five eggs.—The Short-eared Owl is nearly of the same size as the bird we have just noticed; its horns never consist of more than three feathers, while those of the Long-eared Owl are composed of six. The Short-eared Owl flies by day; it is migratory, visiting this country in the latter end of the year, and departing again in the spring.

The White Owl, Barn Owl, or Screech Owl, and the Brown Ivy Owl, are very common birds. The White Owl inhabits barns, out-houses, &c. Its feathers are principally of a fine buff colour, speckled with black and white; the legs are feathered to the toes, and the wings extend beyond the tail. It lays four or five eggs, of a whitish colour, in the holes of walls. Its food generally consists of mice, of which it devours great numbers, swallowing them entire, and afterwards throwing up the bones, skin, &c., in small round masses. The Brown Owl frequents woods, and builds in hollows of trees. Its plumage is diversified with brown, black, white, and yellow; it is feathered to the toes, and feeds on mice, moles, &c. Some of these birds are remarkable for the smallness of their size; there is a Siberian species which

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barely exceeds a Sparrow in bulk; and another, the Little Owl (fig. 18), which is not much larger than the Thrush; it is occasionally found in England, and sees better by day than night. It preys on small birds, mice, bats, large insects, &c. It plucks the feathers from the birds which it catches, tears them to pieces, and swallows them by morsels. Its plumage is brown, spotted with white, and a black edge borders the circular feathers on the face, which are also white.

PASSERINE BIRDS.

In this order are ranked the Shrikes, Warblers, Thrushes, Finches, Larks, Fly-catchers, and most of the smaller kind of land-birds, together with the Crows, Hornbills, and some other birds of larger growth. Their food consists principally of insects and grain; some species living on the former, some on the latter, and some on both. They chiefly build in trees or bushes; their nests are remarkably neat, and, with the exception of the Wrens and other small species, they lay a moderate number of eggs. Their flight is quick and fluttering; their limbs are slender; their shanks and toes are covered with shields in front; their toes are four in number, three in front and one behind; their claws are usually short and slightly curved; and their bills are most commonly of a conical form. The feet are especially adapted for perching, from which circumstance these birds have been called INSESSORES, or *Perchers*, by many writers. When on the ground they seldom walk, but usually hop with both feet simultaneously. (Figs. 19 and 20, beak and foot of Chaffinch.)

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Swallows (Hirundinidæ).—Of the Swallow family, this country is regularly visited by four species: the Chimney Swallow, Sand Martin, House Martin, and Swift. The bill is small, bent, broad, and depressed at the base (fig. 21, the head of the Swift), the head is flat, and the opening of the mouth wide; the tongue is cloven, short, and broad, and the tail forked. The foot of the Swift is very remarkable—all the four toes pointing forward (fig. 22).

The Swallows, from the cheerful days of spring, when they first make their appearance, until the time of their departure in autumn, almost constantly present themselves to our eyes. These birds are more truly creatures of the air than any of their feathered brethren; they live on the wing, and their brilliant career from morning till night, chasing the nimble little insects on which they

feed, is rarely interrupted, except to gather materials for their nest, to build their snug "little mud cabins," to brood over their eggs, or to carry food to their nestlings. They are perfectly harmless, social, entertaining, and productive of much benefit, by clearing the air of numberless insects, which, if not reduced by the Swallow tribe, would in the summer season be exceedingly troublesome. A Swallow, we are informed by a modern writer, which was taken young and domesticated, ate from seven hundred to a thousand flies a day; and Mr. Henry Woods states, that he found in three Swifts, which he dissected, so many small black flies, that they weighed nearly a quarter of an ounce, and which, from their minuteness, must have amounted to countless myriads.

Naturalists seem to have had considerable difficulty in disposing of the Swallow tribe during the winter months. Some have been of opinion, that these birds do not seek more genial climes at the approach of winter, but remain in a torpid state during the cold months in hollow trees and under banks; others assert that they retire to rivers and lakes in autumn, and lie in clusters under water until the spring; but however well authenticated the facts may be which have been adduced in support of these statements, it is clear that the Swallows are migratory birds, for they have been met with on several occasions at sea; vast numbers of them, as it is recorded, have been known to alight on the rigging of a ship in the evening, and disappear in the morning. On one occasion only have we ever had the pleasure of seeing these birds congregate previously to their annual migration, and we have seldom witnessed a more interesting sight. At the latter end of autumn, some years ago, the Swallows began to assemble about a row of houses on an elevated situation in the west of England; their numbers were increased daily, by the arrival of other flocks, and at the end of a week they amounted to myriads; clinging to the window-frames and every little projection, they nearly blackened the face of the buildings. At intervals they took short flights, darkening the earth beneath them as they flew; on these occasions not a single bird was left behind; they all seemed to cast themselves upon the wing at the same moment. By degrees the circle of their flights was increased; there appeared to be no longer a daily accession to their numbers; and early in October they disappeared in one vast body at daybreak.

In the same year, and nearly at the same place, we remember having witnessed an aërial fight between a flock of Swifts and a long-winged Hawk. We had for some time been gazing at the bird of prey, alternately hovering in the air, without advancing a feather's length, for nearly a minute together; then suddenly darting downward with the swiftness of an arrow, recovering itself

within a few yards of the earth, and rising again by a bold and rapid flight to its former elevated station; sailing thence by a beautiful descent, with outstretched and motionless pinions, towards a distant wood—wheeling round, and again returning with miraculous speed, and exhibiting all those powers of wing for which its species is remarkable; when, by degrees, it was surrounded by a flock of Swifts, of whose presence it seemed for some time careless—continuing its beautiful and varied flight—while the Swifts approached nearer and nearer, and seemed preparing for an attack. Suddenly they uttered a wild and general scream, and with one accord advanced upon the Hawk. In another instant the scream ceased, the Hawk had soared above the flock, and two of the Swifts were falling lifeless to the earth. By no means daunted, the assailants in a short time recovered from the disorder into which they had been thrown, and gradually rising, were soon upon a level with the Hawk, and renewed the assault; the struggle was more severe, and of greater duration than before; for nearly half a minute the Hawk was completely concealed by his enemies, who seemed clinging to him on all sides; they appeared like a small dark mass of many wings rapidly descending, from which maimed birds dropped at short intervals, and a continued scream proceeded, until the mass was dispersed, and the Hawk again triumphantly soared above the Swifts, numbers of which now retreated from the strife; some of them returning to the usual elevation of their flight, while others, apparently with great difficulty, supported themselves towards the nearest place of rest. But the main body still continued the fight; another struggle ensued, which terminated precisely as the second; and the Hawk now exerted himself to the utmost to escape, by high soaring, from the Swifts, many of which followed him to an immense height, and boldly continued to assail him as long as we could distinguish their motions. The Purple Martin of North America has the same instinctive prompting to attack birds of prey; and Wilson tells us that he "is the terror of Crows, Hawks, and Eagles."

23

The Common Swallow (fig. 23) builds its curiously-constructed nest on the insides of chimneys; it is of a cylindrical shape, open at the top, made of mud mixed up with straw and hair, and lined with feathers. The nest of the Martin is made of the same materials, and is usually, as our readers will recollect, fixed under the eaves of houses, or at the corners of windows.

Wherever it may be built, the nest of the Martin is rarely disturbed.

The Sand Martin is the least of our Swallows; it builds at the ends of deep holes, which it makes in sandy banks, near the rivers which it frequents; the materials of the nest, which is slovenly made, are feathers, dry grass, and straw.

The Swift, which is the largest of the British *Hirundines*, soars higher than, and never associates with, the Common Swallow: it delights in flying rapidly round high buildings; and builds its nest in steeples, towers, or other equally elevated places. The legs of the Swifts are so short, that if they happen, by accident, to fall on the ground, they experience considerable difficulty in rising again; yet their nests are composed of things which are usually found upon the surface of the earth; such as moss, dry grass, feathers, bits of hemp, pieces of linen, silk, &c. It is true, that most of these materials are occasionally carried to some height by the wind, but scarcely in sufficient quantity, one would imagine, for the construction of their nests; it is, however, possible, that they may collect enough, at the usual elevation of their flight, to serve their purposes, or gather the articles as they skim over the surface of the ground. Some authors assert, that they rob the House Sparrow of his hoard; and even frequently expel him from his chosen retreat, to occupy it themselves. The eggs of the Swift and Sand Martin are white; those of the Chimney Swallow, white, speckled with red; and of the Martin, white, with a dusky tinge at the larger end.

One of the most celebrated species of this family is the Esculent Swallow or Swift, an inhabitant of several of the islands in the Indian Ocean, where its nests are sought after with avidity, and imported into China as an article of food. They are composed of a gelatinous matter, and are boiled down to make rich soups and gravies. It was long a disputed point whence the Swifts derived the materials of their nests, but it seems now to be decided that it is a secretion of the bird itself.

Goatsuckers (Caprimulgidæ).—The Night-jar is the only bird of this family known in England; it is very commonly called the Goat-sucker, which name it obtained from a vulgar error, which has been long exploded, that it sucked the milk of goats. In addition to the two names which we have mentioned, this bird is sometimes called the Churn Owl, the Dor Hawk, the Night Swallow, and the Fern Owl.

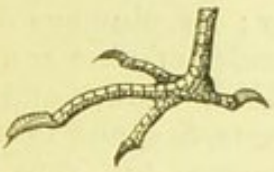
24

The bill of the Night-jar is usually flat, and rather hooked at the point; from the upper mandible spring several strong bristles,

which enable it more effectually to secure its prey, consisting of moths, beetles, and other insects (fig. 24, the head and tongue of the Night-jar). A membrane connects the toes as far as the first joint; the middle one exceeds the others in length, and one side of its claw is serrated (figs. 25 and 26, toe and foot of the Goatsucker). Mr. White has expressed an opinion, that the foot of the Night-jar is useful in securing its prey; as he observed, that the bird, while on the wing, frequently put up its foot, as if it were in the act of conveying something to its mouth: most probably, it catches those large moths, on which it is known the bird feeds, with its foot, and tears them to pieces with the hook of its beak. One of the correspondents of the 'Magazine of Natural History,' for November, 1828, states, that the stomach of one of these birds, which he opened, was crammed with the undigested remains of *Melolontha vulgaris* and *Hepialus humuli* (see fig. 41, p. 188, and fig. 95, p. 223, of this work).

25

26



The Night-jar is a bird of passage; it arrives in this country so late as the end of May, and leaves us early in September. It is a solitary bird, and, unless disturbed, is seen only in the evening, or night; except on gloomy days, when the sun is not visible. The female lays her eggs on the bare ground; they are two or three in number, of a dull white colour, spotted with brown. It is impossible to give any accurate, particular description of the plumage of the Night-jar, which is a beautiful medley of colours, chiefly brown, of various shades, dashed with black, rust-colour, and white. The male has one oval spot of white near the end of each of the first three quill-feathers, and another on each of the outer feathers of the tail. In length it is generally between ten and eleven inches. It is often seen flying about commons, in the dusk of the evening, in quest of its prey. When perched, it utters a peculiar jarring cry, from which it takes one of its names; it has but one other note, which resembles the buzzing noise of a spinning-wheel (fig. 27, the Night-jar).

27

There is a species of this family in Virginia, called Whip-poor-Will, which, like the Goat-sucker known in this country, is considered a bird of ill omen.

Rollers (Coraciadæ).—The Roller, or Garrulous Roller (which name it has obtained from the chattering noise it makes), has a

28

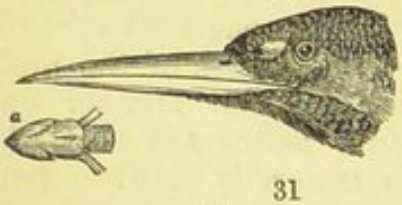
straight black bill, hooked at the point, and the base covered with bristles (fig. 28); there is a wart below each ear; the eye is encircled with a naked skin of a yellow colour. In its appearance it bears some resemblance to the Crows, near which it was formerly placed, but the researches of modern Ornithologists have shown that it should be classed with the Fissirostral Birds.

The Roller is about the size of the Jay; its plumage displays an exquisite union of the most beautiful shades of blue and green, mixed with white, reddish brown, and black. It feeds on worms, insects, &c., and is common in every part of Germany, but rare in this country. This bird is said to be migratory in May and September. It generally builds its nest in Birch-trees; but it is stated that in those countries where wood is scarce, as in Malta, and some parts of Africa, the Roller makes its nest on the ground, or in holes in the banks of rivers. "If this be the fact," observes Buffon, "it will follow that the instincts of animals can be modified by situation, climate," &c. The eggs are of a white colour, with numerous dull spots; they are about the size of those of a Pigeon (fig. 29, the Garrulous Roller.)

29

Kingfishers (Alcedinidæ).—"The little Halcyon's azure plume" has too often delighted our eyes, while "reclining beneath the willow," to suffer us to pass over this favorite of the poets without a notice. The characters of the family are, a straight, strong, and sharp bill (fig. 30); a short sharp-pointed tongue (*a*); and the three lower joints of the exterior toe attached to the middle one. (Figs. 30 and 31, beak, tongue, and foot of the Kingfisher.)

30



31

The Common Kingfisher (fig. 32) is larger than the Swallow; the upper mandible of the bill is black, the lower yellow; the coverts of the wings and the top of the head are dark green, spotted with azure; the belly is orange, and the back and tail are of a brilliant blue. This bird is very voracious; it preys upon small fish: hovering over the surface, as the Hawk above its quarry, the Kingfisher, as soon as an opportunity occurs, darts with unerring aim upon its victim. The male is remarkable for his attention to the female during incubation;

he brings her large quantities of fish to the nest in which she is sitting; and thus the hen Kingfisher, unlike other birds, is always, at this season, in excellent condition. As the Woodpecker bores holes in trees, so does the Kingfisher, by means of its bill, excavate a nest in the bank of some stream, in which there is plenty of fish. The nest-hole is usually a yard in depth, wider at the bottom than the top. Numerous nearly allied species are found in all parts of the world, especially in tropical regions.

32

Bee-eaters (Meropidæ).—The birds of this family are distinguished by a long, slightly curved bill; by the great length of the two middle feathers of the tail; and by the union of the three toes for a longer or shorter distance from their base. The common Bee-eater is an abundant bird of passage in the south of Europe, crossing the Mediterranean every summer in great numbers from Africa. In its habits it resembles the Swallows, assembling in small flocks, and hawking about in the air in pursuit of insects. The Bee-eaters breed in holes which they excavate in clay banks to a depth of about six inches, and line with soft moss.

Creepers (Certhiadæ).—The Common or Brown Creeper is a very small bird, which occurs frequently in woods and parks in this country, running upon the trunks of the trees in search of the insects which conceal themselves in the crevices of the bark. While thus engaged it supports itself by means of its tail, the feathers of which are stiff and pointed. It is a small brown bird, with a slender curved bill, and short, rounded wings. The female lays from seven to nine eggs in a nest constructed of small twigs and grass, and lined with feathers, deposited in a hole in some old tree.

The little Wren, so often seen flitting swiftly about the hedges, also belongs to this family, although it certainly possesses some relationship to the little Goldcrest or Kinglet, which is now classed with the Warblers. But the most remarkable bird of the family is the Lyre-bird of Australia, which is about the size of a Pheasant, and possesses a tail of the singular form represented in the annexed figure. It lives upon the ground, and runs with great facility by means of its long and rather strong legs, so that we are the less surprised at its having been long regarded as a Gallinaceous

33

bird. It constructs an exceedingly neat nest, principally composed of mosses and roots, and is said to have a pleasing song.

Humming Birds (Trochilidæ).—This is a very large family of beautiful and interesting species. The characters are—a remarkably fine beak, longer than the head, the upper forming a sort of case for the lower mandible, the tongue formed of two threads, and the feet ambulatory (fig. 34, beak of Humming Bird).

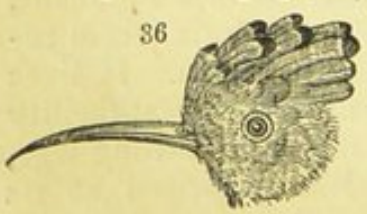
34

The Humming Birds in America are as numerous as butterflies here; many of them no larger than humble bees, and they have been described as hovering, "from morn till dewy eve," about the flowers, and extracting their sweet juices without ever settling upon them. Wilson, the author of the 'American Ornithology,' has frequently found insects in the crop of the *Trochilus colubris*, and the experienced Waterton positively asserts that Humming Birds feed on insects. In the warm regions they live in the fields the whole year round; in the colder climates they are migratory. The nest of the Humming Bird is elegant, and delicate as its fairy architect; the materials of which it is composed are chiefly small vegetable fibres and fine moss; it is lined neatly, and suspended from the bough of the citron, the orange, or the pomegranate-tree. The eggs of the smallest of these magnificent little beauties are about the size of a small pea, and the male and female both incubate; the male bird relieves his mate in the morning and evening, when the flowers are sweetest and just refreshed with dew. The Humming Bird does not derive its name from its note, which is a low chirrup, interrupted and rather unpleasing, but from the humming noise produced by the quick motion of its wings. No general description could impart an idea of the plumage of these birds, they differ so widely in their hues; the breasts of some of the species display all the colours of the rainbow, visibly united, but so finely blended that it is impossible to fix the boundaries of either (fig. 35, the Humming Bird). Beautiful illustrations of these charming little creatures will be found in Mr. Gould's magnificent work on the family.

35

Hoopoes (Upupidæ).—The characters of this family are—an obtuse, short, triangular tongue; a long, convex, bent, obtuse beak (fig. 36, beak of the Hoopoe), and ambulatory feet. The Common Hoopoe is a migratory bird, and leaves our northern climate about the end of August; it is about the size of a Thrush.

36



The head is adorned with a crest, which the bird has the power of raising or depressing at will; it is composed of two series of feathers, the tops of which are black and white, and the other parts of a pale orange colour; the tail is black, with a white crescent on it, the horns of which point toward its extremity. The wings are black, transversely streaked with white. The Hoopoe feeds on insects and worms; it makes no nest, but lays its eggs in the hole of a wall, tree, or bank (fig. 37, the Hoopoe). Some birds of this family inhabiting the forests of New Guinea are as beautifully adorned with plumes as the Birds of Paradise, with which indeed they were formerly arranged.

37

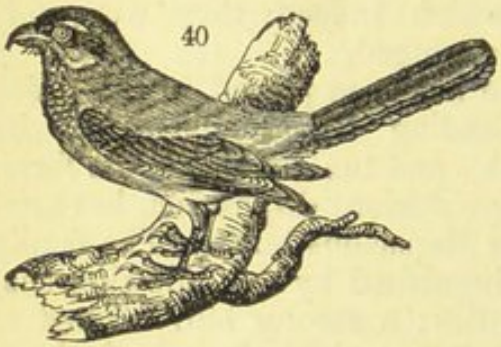
Shrikes (Laniidæ).—The Shrike has been placed in this order by most authors; but, notwithstanding the smallness of its size (being no bigger than a Thrush), and the delicacy of its form, other naturalists, on account of its predacious disposition, have arranged it with the Accipitres, or Rapacious birds. The family is distinguished by the following characteristics: a strong bill, hooked at the end, but straight towards the base, which is furnished with bristles; no cere; the upper mandible notched near the tip; the end of the tongue divided; and the middle and outer toes connected as far as the first joint (figs. 38 and 39, foot and beak of the Great Ash-coloured Shrike).

38 39

Endowed with the most astonishing courage, the Shrike will attack Crows, Magpies, Partridges, and even some of the powerful tribe of Falcons, and chase them from the neighbourhood of its nest. Incapable of tearing in pieces those small birds and animals, on which it preys, by means of its claws, it very dexterously fixes them on a thorn, and then separates their limbs with its bill. To this singular habit the Shrike, doubtless, owes its English name of the Butcher-bird. Pennant observes, that even when confined in a cage, the Shrike will fix its food against the wires before it begins to eat; and a traveller in Russia states, that a Butcher-bird, which he had procured in that country, and taught to perch on a stick, sharpened at one end, would seize any small bird that was let loose in the apartment, strangle it in an instant, and then forcibly transfix it on the stick with its bill and claws. If several

birds were given to him, he would use them all in the same manner; and, when properly fixed, leave them dangling by the neck in his little larder, until his appetite urged him to devour them. In addition to this curious habit, the Shrike is said to imitate the notes of small singing-birds, in order to draw them near its haunts; and in America, we are told, the Butcher-birds bait thorns with grasshoppers, to decoy the lesser insectivorous birds into situations where they may easily be seized. That the Shrike transfixes insects on which it preys, as well as flesh, in the manner described, we see no reason to doubt; and it may be, that it has killed other birds which attempted to despoil it of its food; but it is more probable that the insects are so placed, after the Shrike has had a full meal, by way of reserve for another occasion, rather than as a bait to other birds.

The Great Ash-coloured Shrike (fig. 40) is about ten inches in length; a black stripe passes from the beak along the side of the head, beyond the eye; the upper parts of the plumage are of a bluish ash-colour, all the under parts and the edges of the tail are white; a bar of the same colour crosses the wing. In the cultivated parts of England this bird is rarely seen. It builds in trees, and the female lays five or six eggs of a dusky gray colour, variegated at the larger end with dark spots.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The Lesser, or Red-backed Shrike, is a smaller species of this genus; similar in form, but different in plumage, to the Ash-coloured Butcher-bird. The colours of some of the foreign Shrikes are remarkably beautiful: species are found in Asia and Africa, as well as in different parts of Europe and the New World; all of which transfix their prey in the manner we have described.

Fly-catchers (Muscicapidæ).—Although the species of this family are exceedingly numerous, only two are found in this country, and these are both birds of passage, visiting us only in the summer. The useful instincts and propensities of this active little race, says a modern author, are chiefly confined to countries under the more immediate influence of the sun, where they are of infinite use in destroying the noxious insects engendered by heat and moisture, which are continually upon the wing. Buffon has also remarked, that the useful destination of the Fly-catchers will occur to the most superficial observer: the insect tribes elude the interference of man; and, though despicable as individuals, they often become formidable by their numbers. Instances are re-

corded of their multiplying to such an amazing degree, as to darken the air; of their devouring the entire vegetable productions; and of their carrying in their train the accumulated ills of famine and pestilence. Happily for mankind, such calamities are rare; and Nature has wisely provided the proper remedies.

41

Most birds search for the eggs of insects; many feed on their grovelling larvæ; some subsist on their crustaceous chrysalides; and the Fly-catchers seize them after they escape from prison, exulting on their wings. Like the Shrikes, the Fly-catchers have a notch on each side of the upper mandible, but the bill is weaker, broad, and depressed towards the base, where it is beset with strong bristles (fig. 41).

42

The Pied Fly-catcher (fig. 42) is about five inches in length; the bill, legs, top of the head, back, and tail, except the outer feathers, are black; the forehead, and all the under parts of the body, the outer feathers of the tail, parts of the greater coverts and secondary quills, are white; the wing-coverts dusky. The female has no white on the forehead; her plumage is brown, where that of the cock is black.

Thrushes (Turdidæ).—The rich-toned Throstle, called, by one of our poets, the mellow Mavis; the Fieldfare; and that brilliant songster, the Blackbird,—are the most common British birds of the Thrush family; to which, also, belong the Ring-Ouzel, and the Redwing, the Brown Indian Thrush, the Golden-crowned Thrush, and several other species. All the birds of the Thrush kind, have a little notch on each side at the end of the bill, which is rather straight, and slightly bent towards the tip; the nostrils are oval and naked. (Fig. 43, beak of Blackbird.)

43

The size, shape, and plumage of the Thrush and the Blackbird, or Black Ouzel, are too well known to require any particular description. The Throstle begins his song early in the spring, and continues it during part of the summer. The female lays five or six eggs of a light-blue colour, marked with dusky spots. The nest of the Throstle is generally built in bushes, and made of dry grass, clay, and rotten wood. These birds feed on insects, and the berries of holly, misseltoe, &c. When kept in cages, their usual food, as well as that of the Black Ouzel, is raw or parboiled meat, sopped bread, stale bun, scalded fig-dust, or bruised hemp-seed and chopped egg mixed with crumbs of bread.

The Blackbird (fig. 44) sings as soon as the Thrush, and con-

tinues to enliven the woods with his full, melodious notes for four or five months. The nest of the Blackbird is built in a low bush, generally a holly; the female lays four or five eggs, regularly marked with spots of a dusky hue on a bluish ground. Blackbirds cannot be kept in Aviaries on account of their quarrelsome disposition. They are excellent song-birds for the cage; and, if brought up from the nest, may be taught to whistle tunes very correctly: the practice, however, in our opinion, is a bad one; we look upon it as a great waste of time, tending to no good purpose: the native notes of the Blackbird are excellent; and it seems a pity "to spoil a good song-bird, by making him a middling musician." Netted Blackbirds are, generally, worthless in a cage: those only which are reared from the nest, and have never known the sweets of liberty, become good songsters in a state of captivity. They are so addicted to mocking whatever sounds they hear, that a Blackbird, brought up in the metropolis, has often been known, not only to imitate the notes of the birds near him, but even the cries of those persons who carry various sorts of wares for sale about the streets. To obtain a good Blackbird, rich in his native note, we must go into some retired village; and there we may probably discover a fine Black Ouzel, in a plain wicker cage, beneath the eaves of a labourer's cot, chanting the notes which he has heard his free sire singing from the holly-tree top in the adjacent wood.

44

The Water Ouzel, or Dipper (fig. 45), is generally found near rapid streams; particularly where the flow of the current is broken by rocky fragments. Its plumage is impervious to water; and it has the singular faculty of diving beneath the water, in search of its prey. It is said by some authors to walk upon the bed of the stream in which it dives; but this appears to be an error, as, from the accounts of trustworthy observers, it progresses through the water by the agency of its wings, and may thus be said to fly through the liquid element. On coming to the surface it can swim easily, and dive again from this position. It is worthy of remark, that the toes of these birds are not webbed, but, on the contrary, most distinctly parted.

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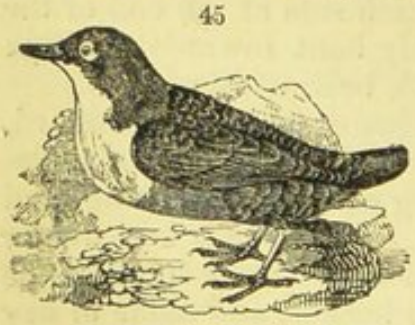
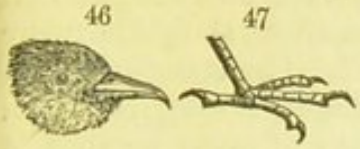


Warblers (Silviidæ).—The birds of this family differ much in

size and habits; they are found in most parts of the world; many of them are migratory, and others remain with us all the year round. The bill is slender, weak, and beset with small bristles at its base; the head is generally small; the nostrils small and rather depressed (figs. 46 and 47, head and foot of the Robin); a small membrane connects the middle with the outer toe.



In this family naturalists place the Nightingale, a bird famous above all others for the exquisite beauty of its song. There is nothing peculiarly elegant in its shape, or handsome in its plumage; the upper part of its body is of an olive brown, the throat nearly white, and the breast and belly are of a pale ash colour; in length it scarcely exceeds six inches. The Nightingale, like other birds of this family, feeds chiefly on insects. It is migratory; visiting England in the beginning of April, and quitting it in the month of August for those climates where, during the remainder of the year, insects are found in sufficient quantity for its support. The Nightingale is a solitary bird, and generally sings during the night; of its notes no adequate idea can be conveyed by words. The following is an animated description of the Nightingale's song, taken from the work of a talented author; but it falls short of the delightful reality; "The leader of the vernal chorus begins with a low and timid voice, and he prepares for the hymn to Nature by assaying his powers, and attuning his organs: by degrees, the sound opens and swells—it bursts with loud and vivid flashes—it flows with smooth volubility—it becomes faint and murmurs—it shakes with rapid and violent articulations—the soft breathings of love and joy are poured from his inmost soul—and every heart beats in unison, and melts with delicious languor. But as this continued richness might satiate the ear, the strains are at times relieved by pauses, which bestow dignity and elevation; the mild silence of evening heightens the general effect, and not a rival interrupts the solemn scene."

Several of our poets have enriched their works with passages relative to the Nightingale; but they differ strangely as to "the humour of its song." Some of them, as Milton, deem it "most musical—most melancholy." "Forlorn Philomel" is a poetical expression which has long been hackneyed in prose and verse; but a serious poet of modern times has rightly, in our opinion, described its song as possessed of joyous qualities. He says—

'Tis the merry Nightingale,
That crowds, and hurries, and precipitates,
With fast, thick warble, his delicious notes.

The hen entirely performs the task of incubation; the male bird

brings her food during the day, and at night, from some adjacent spray, sings his sweet carol, doubtless to solace and delight her. With him it is a season of joy; and why, therefore, should he make his mate melancholy by "songs of sorrow?" The associations of time and place when and where the Nightingale's song is heard, have given it, in the imagination and memory of many persons, a sadness which neither the song itself possesses, nor would be attributed to it, were the Nightingale, like the Lark, to "carol his lay" when the sun is rising in glory above the hill-top, and the leaves flutter in the morning breeze, and the floweret, refreshed by the dew-drop, again lifts its fair face to heaven, and all nature looks jocund.

Caged Nightingales are usually fed with egg boiled hard, grated, and mixed with boiled sheep's-heart; a mixture of bruised hempseed and bread is sometimes substituted for the egg. The food must be made fresh every day; and clean water, in which the bird may bathe, should be frequently placed in a little pan on the floor of the cage; meal-worms and ants' larvæ should occasionally be given as a treat, particularly the latter, if they can be conveniently procured. Nightingales must not be kept in any of the ordinary bird-cages; the proper cages for these birds are dark on their sides, the perches are padded, and a piece of green baize is stretched across the top, an inch or two below the roof; these precautions are taken to prevent the bird from hurting itself, which it would otherwise be in danger of doing. When kept in a room, or an Aviary out of doors, they are furnished at the mating-season, which is about the end of April, with slender roots, dry grass, twigs, oak-leaves, hair, down, and other fine and warm substances, with which they may build their nests. The female lays four or five eggs of a greenish-brown colour; and in a wild state produces two, and sometimes three, broods in a year. There are several species of this family found in different parts of the world. (Fig. 48 is the American Nightingale.)

48

In the same family as the Nightingale are classed several other well-known birds: the Redstart, the Blackcap, the Whitethroat, the Robin, the Wheatear, &c.

The Blackcap, the Whitethroat, and the Redstart are birds of passage, arriving in England about the middle of April, and departing in September, or early in October. With his winter habits, the Robin has doubtless made the reader tolerably well acquainted. In summer he is rarely seen, being engaged in the

cares of providing for his little family. The nest of the Robin is usually made in a solitary spot, about the roots of trees, or the holes of old buildings, and concealed by dry leaves; we have heard of a pair of Robins having built in an old hat, which had been set up in a garden to scare away small birds! The Redbreast is much beloved, and its familiarity has procured it peculiar names in many countries. In Germany it is called Thomas Gierdet; in Norway, Peter Ronsmad; about Bornholm, Tomi Liden; and, we need scarcely add, in England, Robin Redbreast. —The Golden-crested Wren is the smallest of British birds, being scarcely three inches and a half in length, not more than five in breadth, and less than thirty grains in weight; it has a fine dash of orange on the top of its head; the plumage on the upper parts of the body is dusky and green, and that of the throat and belly white tinged with green. (Fig. 49, the Golden-crested Wren.)

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Wheatears are very common in autumn about the south coast of England, where, authors state, they probably subsist some little time before they take their departure, they being migratory birds, and visiting this country about the middle of March. Although not bigger than Larks, Wheatears are highly esteemed as birds for the table; they are caught in great numbers in the harvest-time, on the coast of Sussex; and, taking their size into consideration, fetch very high prices. Wheatears frequently build in old rabbit-burrows, or by the sides of stones; the nest is made of dry grass, moss, and wool, and lined with feathers; and the hen lays five or six eggs of a light-blue colour, encompassed at the larger end with a belt of a deeper hue. (Fig. 50, the Wheatear.)

50

Titmouse (Parus).—The individuals of this genus, which also belongs to the family of the Warblers, are remarkable for their vivacity, and the courage and strength which they display. They are found in various parts of the world, and are exceedingly prolific. Their food is insects, and they may often be seen in the spring months dexterously picking out caterpillars from the opening buds. Their nests are constructed with most exquisite art; they lay a considerable number of eggs, and are very attentive to their young. Possessed of great intrepidity, they attack birds much larger than themselves. Buffon says they pursue the

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Owl with great fury, and in their attacks chiefly aim at the eyes. They have short conical bills, bristled at the nostrils, which are small and round; the tongue is truncated, and terminated by three or four bristles (fig. 51, beak and tongue of Titmouse). There are several species of Titmice, the most common of which is the Blue-cap, or Tom-tit, as it is frequently called. This little creature, which is not above four inches and a half in length, lays as many as twelve or fourteen eggs. Grain, as well as insects, are devoured by this bird; it will peck bones on dunghills; and as Mr. White, in his 'Natural History of Selborne,' very accurately states, is a vast admirer of suet, and haunts butchers' shops. The same author observes, that it will also pick holes in apples left on the ground, and be well entertained with the seeds of a sunflower. We recollect an instance, in support of the latter statement, which occurred some years ago. In a small garden, attached to a house in a very populous part of the metropolis, several fine sunflowers, about the time the seeds began to ripen, were visited by a Blue Titmouse, who—notwithstanding he was frequently scared by persons passing to and fro, and on two or three occasions with difficulty escaped the claws of a cat—continued to feed on them for above a week. At that time of the year insects were getting scarce, but there were a few stragglers still lingering about the sunflowers and adjacent plants; and when the Blue-cap happened to meet with them, his exultation was truly ludicrous. Mr. White informs us, that during deep snows he has seen the Great Titmouse, while it hung with its back downward, draw straws lengthwise from the eaves of thatched houses, in order to pull out the flies that were concealed between them.

The Long-tailed Titmouse (fig. 52) constructs a very curious nest; it is of an oval form, with a small hole near the upper part for an entrance; the principal material of the nest is moss, bound together by the silk of insects; it is lined with down and feathers, so arranged that their soft webs all point inward. In some parts of the country, the nests of this species are called Long-pots, and in other parts Feather-pokes. These active and busy little birds, like the other Titmice, feed on insects; they lay from fifteen to eighteen eggs, about the size of a large pea, generally white, but sometimes freckled with delicate spots of red.

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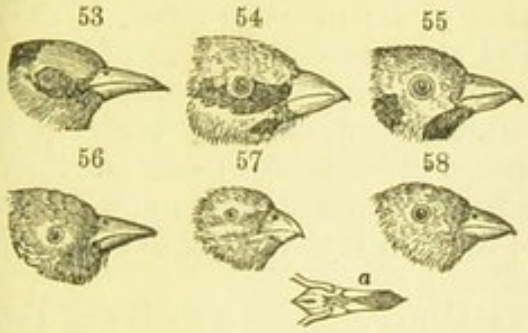
Finches (Fringillidæ).—The beak, in this family, is cone-shaped,

remarkably sharp at the point and thick at the base, and destitute of teeth or notches. The Finches frequently assemble in large flocks; they feed on insects and their eggs, as well as seeds and grain. (Figs. 53, 54, 55, 56, 57, and 58, beaks of Goldfinch, Sparrow, Mountain Sparrow, Mountain Finch, Canary, Red-poll Linnet, and (*a*) tongue of Canary Finch.)



This family comprehends an immense number of species, several of which are equally admired for the beauty of their plumage and the liveliness of their song. To enter into any description of the colours of the Goldfinch, the Linnet, or the Canary, would be superfluous; nor is it even necessary to dwell on the mode of treatment most congenial to their habits when kept as song-birds; for who does not know that these gay little warblers delight in being placed, during the merry spring-time of the year, where the sunbeam may gild their plumage with a richer glow?—in the sultry season, abroad, but in the shade?—and, while their feathers are falling, and throughout the winter, in "some choice location," which is at once sheltered, but not solitary?—or that they live on seeds, and require to be regularly provided with food and water, for which, in return, the pretty captives make their little mansions merry with their melody? The Goldfinch (fig. 59), when kept in a cage, loses, in moulting, the freshness and beauty of its plumage: those which are purchased in autumn, possess the livery they wore in the woods; and it is never again equalled, while the birds remain in a state of captivity. The proper time for purchasing these birds is when the young ones flock, at the latter end of the summer: those which are taken in spring, frequently pine, and rarely prove good songsters in the cage. The Goldfinch builds a very beautiful nest of moss and other soft materials, and lays five or six eggs, which are white, and marked at the end with purple spots.

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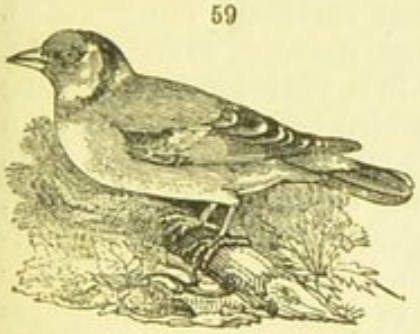

The Linnet (fig. 60) has a great number of admirers, and, when rich in song, is deemed valuable. Young birds are often, as the curious express it, brought up under an old Linnet of reputation as a songster; and from being kept in the same room long enough to acquire the variety of notes and execution of

its master, the little pupils are reckoned worth two or three guineas each; or even more, if they exhibit any unusual powers of voice. The nest of the Linnet is usually built in a white-thorn, or furze-bush: it is composed of bents, moss, &c., and lined with fine down, and sometimes horse-hair; the hen lays four or five whitish eggs.

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The Canary is not a native of this country: the species is found in a wild state in the Canary Islands; whence it has been introduced to all parts of Europe, and reared in cages and Aviaries with great success. There is a Canary-club in the metropolis, the members of which meet once a year to exhibit their birds; and premiums are awarded to the owners of such as are most perfect in shape and plumage (they care but little for song), according to a certain standard of beauty, which Canary-fanciers have set up and very well understand, but which we should find a difficulty in describing. Canaries will learn the notes of other song-birds, if they be placed within hearing of each other; they may also be taught to whistle tunes with tolerable correctness. In a work, published above a hundred years ago, by Bernard Lintot, on Canary-birds, more than twenty different sorts are enumerated. The author states, that "there were some persons, even of note, who drove an open trade with them the first year after they came to this city." Although the Canary is a bird in more esteem than the Goldfinch or Linnet, we plead guilty of being so Gothic as to prefer either of these natives of England to the little foreigner, who, in our opinion, is too noisy to be agreeable: indeed, the ambition of the Canary is not confined to singing down all other birds; for it frequently tries its utmost to drown, in the loudness of its song, the notes of instruments, and the voices of those who talk or sing within its hearing.

Canaries are frequently bred in cages and Aviaries, and sometimes united with Goldfinches or Linnets. Ten or fifteen couples may be kept together in a large room, which should be fitted up with nest-boxes, apart from each other, or placed in pairs at the different corners. When kept in a cage, they should have two boxes or pans to build in; little bags, containing materials for the nest, must be hung up inside the cage: these bags are to be bought at the bird-shops; and also little ivory balls, which are used to replace the eggs that are taken out as they are laid, for safety's sake, until the hen is ready to sit. She usually lays four or five

eggs, and sits fourteen days. She will sometimes hatch a second brood before the first are ready to quit their nest: in this case, the cock-bird attends the first brood until they are able to feed themselves. Canaries are usually fed upon canary-seed, without any preparation; but when they have young ones, it is advisable to give them soft meat, such as a mixture of yolk of egg boiled hard and grated, a few crumbs of fine bread, and a little scalded rape-seed bruised among the egg and bread. Food of a similar kind should also be given to the young birds, after they have left their nest, until their first moulting; they are then to be brought to hard seed by degrees. They should, occasionally, be afforded a little groundsel, or chickweed, and their cages, as well as those of all other birds, kept particularly clean.

The House-Sparrow is nearly related to the Linnet and Canary. Buffon, very improperly in our opinion, reproaches this bird for its familiarity: the Robin is esteemed and protected for visiting the dwellings of man at a season when the woods and meads would afford it but a scanty supply of food; but the primrose has scarcely appeared on the hedge-row when the Robin quits us for his old haunts; while the House-Sparrow abides with us throughout the year, it constantly affects society, and is never found in the woods: the abode of man is its home, it rears its nestlings under his roof, and enlivens the heart of the most busy and populous towns with its presence. Its utility, as a destroyer of insects, compensates for the mischief which it does; and it deserves to be protected rather than proscribed.

The Grosbeaks are solitary birds without much vocal powers, and which, excepting the Bulfinch, are but little known in this country. The principal characteristic of the group is a thick, short, convex bill (fig. 61, bill of the Hawfinch): that of the Crossbill (fig. 62) is very singular; the upper and lower mandibles cross each other in opposite directions, and "seem to have been formed for detaching the scales of the fir-cones, and obtaining the seeds lodged beneath them, which are the principal food of this bird."

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The Crossbill (fig. 63) is about the size of a lark; its general colour is reddish; it occasionally visits this country, but is an inhabitant of the colder climates, where it always breeds. It is said to fix its nest to a branch by the gummy matter which exudes from the pine-tree, and to plaster its little abode with the same substance, so as effectually to exclude the melted

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snow, or rain, from the interior of its comfortable little tenement.

The plumage of the Hawfinch varies so considerably, that we rarely meet with three or four birds alike. In that of the specimen now before us, the top of the head, the cheeks, back, and lesser wing-coverts are reddish; the back part of the neck is ashy gray; the throat, chin, and the space between the base of the bill and eye, are black; the greater wing-coverts are white; the prime quills have a spot of white on their under webs; the belly and breast are of a light brown; the tail is black, with the exception of the outer feathers, which are tipped with white. The Hawfinch does not possess the "witchery of song." It is an inhabitant of the colder parts of Europe, and only visits this country in severe winters.

The Indian Grosbeak is a very docile bird, and easily domesticated: it may be taught to fetch and carry; and it is an authenticated fact, that a well-trained bird will, upon a signal being given to him, fly down after a ring which has, a moment or two before, been dropped into a well, catch it before it reaches the water, and bring it up with apparent exultation to its master. The Grosbeaks are also instructed to pluck off, and carry away in triumph, at command, the pieces of gold which the young Hindoo women, at Benares, and other places, wear as ornaments, slightly fixed between their eyebrows. The Indian Grosbeak makes its nest of grass, which it weaves like cloth, shaped like a bottle, and with its entrance downwards: it is suspended from the branches of the Palmyra, or some other high tree, and rocks to and fro with the wind. It consists of two or three chambers; and it is the popular belief that the bird illumines its little tenement with fire-flies, which are often found stuck, by means of a little soft clay, on the inside of the nest; they are, however, doubtless, so placed only for the purpose of food.

Bulfinches are found in most parts of Europe, and are celebrated for their faculty of acquiring tunes: it is even said, that instances have been known of two Bulfinches having been taught to whistle in parts. The note of the Bulfinch, in a wild state, is described as being simple, and by no means admirable; but there is a deep and tender beauty in it, for which its acquired airs and graces, when caged and instructed, can never compensate. It is sometimes taught to utter words; and when capable of so doing, is much admired, and highly appreciated. These birds build in thickets; their nests are formed principally of moss; the eggs have a dull-blue tint, and dark spots at the larger end. In the state of confinement they are fed nearly in the same manner as Linnets.

The Buntings very much resemble the Grosbeaks; the principal difference consists in the formation of the bill, the Buntings having

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the sides of the upper mandible bent inwards; the junction of the two mandibles at the base, is formed by an angular projection of the edge of the lower fitting into a corresponding recess in the upper (fig. 64, head of Bunting); the upper mandible is also furnished with a hard knob, of great utility to the bird in breaking, or bursting, such hard seeds and kernels as are adapted for its food

5

(fig. 65, the skull of the Bunting; *a*, the knob). The outer toe is joined, as far as the first joint, to the middle one The Bunting is very common in this country; its note is harsh, and frequently repeated. The female builds in thick grass, and lays five or six eggs: while she broods, the male brings her food, and entertains her with his song, which, doubtless, to her, is most musical and cheering. Buntings are seen in large flocks during a great part of the winter; quantities of them are taken in nets, and on account of their similarity in size and plumage, sold for the table as Larks (fig. 66, the Bunting).

66

—The Yellowhammer and the Snowflake belong to this group: the latter, though rare in the southern parts of England, is often seen in Yorkshire, and abounds in the Scottish Highlands. It does not perch, but runs along the ground like the Lark; which bird it also resembles in the length of its hinder claw. From these circumstances it has been, by some authors, placed in the same genus as the Larks; but the formation of its bill has induced other writers to rank it among the Buntings. It changes the colour of its dress with the season: the head, neck, and under parts of the body, which, in winter, are of a beautiful pure white, in the summer are decorated with transverse, wavy dashes, of a brownish red. It builds its nest in clefts of rocks, in high northern latitudes; and lines its little habitation with fine feathers, and the softest fur of those animals which abide in the same regions.

The delicious Ortolan, which is so prized in Italy, and some parts of France, by the epicure, ranks in this genus of birds. It builds, like the Lark, among grass tufts, or at the foot of some little shrub; and, it is said, warbles very sweetly during the night. It is taken alive, and fattened, in a dark place, for the table, on millet.

The Larks, which also belong to the Finch family, are distinguished by the immense length of the claw of the hinder toe. The

time has been, when it was one of our enjoyments to be upon the hills, before the sun was visible; to watch the Lark, awakened by the first glance of the "gray-eyed dawn," rise into the calm, solitary air, and there carol his loud hymn; to listen to his notes long after the soaring bird was too high to be seen: and, while he continued on the wing, to witness the Bee, the flower, and the Butterfly, shake off the influence of night, and seem to rejoice in the first sunbeams of the morning. Health scattered her roses in our early path; the birds, the wild thyme, and the heath-flower, perfumed the air around us with their fresh and grateful odours: and the melody of Nature, trilled by the bird of the morning, where he fluttered amid the dawning clouds at sunrise, were quite as productive of holy feelings, in our bosoms, as the scientific works of a great composer, chaunted by a vocalist of eminence at a midnight oratorio.

The species most commonly known of this genus are the Skylark and the Woodlark: the homely plumage of each of these is, doubtless, familiar to the reader. The Skylark (fig. 67) is one of the most eminent of our British song-birds, and as great a favorite with the poets as the transcendent Nightingale. Rising almost perpendicularly from his lowly nest, he ascends, by a succession of springs, to an immense height, singing all the while to cheer his brooding mate, whom he continually keeps in view; and, should she attract him, he drops, like a stone, from his elevation, as it were, to attend her bidding; on other occasions, his descent is made in an oblique direction.

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The Larks usually pass their time on the wing or on the ground; the peculiar construction of their hinder claws preventing them from perching, like many other birds of a similar size, on twigs: those even which alight on trees, venture only on the larger branches, which, from their breadth, afford nearlyas secure a footing as the surface of the earth. On the ground, also, the Larks build their nests; the principal material of which is dried grass. The eggs are usually four or five in number: those of the Skylark are of a grayish brown, marked with darker spots; those of the Woodlark dusky, spotted with brown. The Woodlark occasionally sings during the night, and frequently perches upon trees. These birds are very common in this country; and are frequently kept as song-birds. The Skylark will sing freely for eight or nine months in the year; he is very hardy, long-lived, and, if he can be kept from hearing, and, consequently, imitating inferior birds, his song

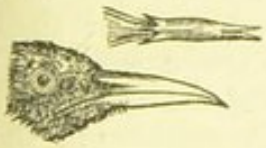
is beautiful. A fresh turf should be placed as often as possible in his cage; and he may be fed on egg boiled hard, chopped small, and mixed with about half its quantity of bruised hemp-seed: this food is also proper for the other Larks; to the Woodlark a little meat, either boiled or raw, but not salted, may occasionally be given with advantage. The Woodlark will sing quite as long, and his notes are nearly as beautiful,—and, indeed, in the opinion of many, rather superior to those of the Skylark. The Titlark, or Pipit, which is also a common species, belongs to the family of the Warblers, in which their nearest relatives are the Wagtails.

Water-wagtail (Motacilla).—The birds of this genus are remarkably brisk in their motions, and continually jerking their long slender tails up and down: hence their English name of Water-wagtail, and their Italian one signifying Shake-tail; in Germany they have an appellative which may be translated Brookstilts. These birds do not hop, but run along the ground; their flight is weak and undulating; they are usually seen about brooks and moist plots of grass, chasing the flies, which constitute their principal food. The Common Water-wagtail builds on the ground: the nest is composed of moss, small fibres of roots, &c. The eggs are usually five in number; white, spotted with brown. In this country, the Wagtail migrates from north to south at the approach of winter. (Fig. 68.)

68

Starlings (*Sturnidæ*).—The Starling is about the size of a Blackbird; its bill is straight and sharp-pointed; when young, of a yellowish brown, but acquiring a deep yellow colour as the bird grows old; its tongue is sharp and bifid. (Figs. 69 and 70, Starling's beak and tongue.) The Common Stare, or Starling (fig. 71), has, for centuries past, been a favorite with man, on account of its docility, and the curious beauty of its plumage. All its feathers have a fine, mixed, metallic lustre; at the end of each is a pale-yellow spot; the general colour is a glossy black, embellished with green, blue, copper, and purple tints. The female builds in hollow trees, old walls, rocks or cliffs near the seashore, and occasionally under the eaves of houses; she lays four or five eggs, of a light bluish ash colour. These birds are found in almost every climate; they feed, in a state of nature, on snails, worms, caterpillars, and various sorts of grain, fruit, and the eggs of other birds. They are seen in large flocks during winter, and associate with other birds, as well as those of their own species.

69 70



This bird may, without difficulty, be taught to whistle tunes, and utter words, or even short phrases; it is one of the very few, among the feathered tribes, the native songs of which are, to the ear of taste, improved by tuition. It has acquired poetical honours by the notice of Shakespeare, who, after that angry interview between Henry the Fourth and Hotspur—during which, the King commands him never, in his royal hearing, to speak of Mortimer again—makes the high-spirited Percy exclaim—

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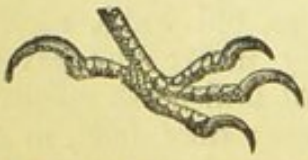
> I'll find him while he lies asleep,
> And in his ear I'll holla, "Mortimer!"—
> Nay, I will have a Starling taught to speak
> Nothing but Mortimer: and give it him
> To keep his anger still in motion!

In addition to its ability for acquiring tunes, and imitating the language of man, the Starling may be taught a variety of droll antics; we have seen one that would fetch and carry, perch on its owner's shoulder at the word of command, lie on its side, and close its eyes as if it were dead, &c. It was rapidly advancing in the mysteries of throwing itself heels over head, and some other equally elegant accomplishments, when, one morning, some dire Grimalkin caught and devoured it. In a tame state, the Starling may be fed on worms, berries, raw meat, soaked bread, scalded meal, &c.

Birds of Paradise (*Paradiseidæ*).—There are several species of this family, all of which are remarkable for the beauty of their plumage. The characters are, a somewhat lengthened, slightly curved, and sharp-pointed bill, beset with soft feathers at the base; and in most of the species certain peculiarly constructed feathers, exceeding the rest of the plumage in length, spring from beneath the wings. It was formerly supposed that the Birds of Paradise were continually on the wing, and destitute of legs and feet; this idea has, however, been exploded; in fact, the legs and feet of the Birds of Paradise are remarkably large and stout, in proportion to their size (figs. 72 and 73, beak and claw of the Greater or Common Bird of Paradise).

72

73



Among the spicy and luxuriant groves of the Philippine and other Indian Islands, the Birds of Paradise associate in immense numbers. It is a popular error that they always follow the king bird, who is distinguished by the exceeding beauty of his plumage; he is about the size of a Blackbird; two filaments proceed from the tail, which are mere shafts, until within a short distance of the extremities, where they become bearded on one side, and terminate in a large circle, open in the centre, of an emerald colour, bright, and ever-varying. The Greater, or Common Bird of Paradise (fig: 74), is principally remarkable for the peculiar feathers, of a fine light-yellow colour, terminating in white, which, emerging from beneath the wings, extend to a considerable distance beyond the feathers of the tail. The webs of these beautiful plumes are open, and resemble very fine hairs.

74

The Gold-breasted Bird of Paradise is about the size of a Dove: its head, cheeks, back, tail, wings, and part of the throat, are of a fine black, shaded with violet; its neck and breast are of a gold colour, and a fine band crosses the back of the neck of a united and varying tint of gold, green, red, and violet. Several black feathers, the beards of which are separated like those of the Ostrich, point upward, and, as it were, embrace the wings; and three long black filaments, terminating in oval webs, spring from each side of the head, diverging in angular forms, and extend to a fourth part of the length of the tail. In the evening, the Birds of Paradise perch on lofty trees, in which the natives lie concealed for the purpose of shooting them with blunt arrows. Their principal food is said to be the larger kind of butterflies and moths. The absurd notion of the Birds of Paradise wanting legs and feet was, doubtless, occasioned by the natives of the islands, where they are taken, cutting off those parts before they sold the stuffed birds.

Crows (Corvidæ).—This family contains numerous species; among them are included the Common Crow, the Raven, Jackdaw, Chough, Magpie, and Jay. The characters are

75 76

a strong convex bill (fig. 75, beak of the Crow), nostrils covered with reclining bristly feathers, a cartilaginous and bifid tongue, and ambulatory feet (fig. 76, foot of the Crow).

The Crow is a very common bird; it feeds on carrion, insects, grain, and indeed on almost everything that comes in its way; it is an enemy both to the sportsman and the farmer; it not only carries off the eggs of Partridges to feed its nestlings with, but destroys young game, poultry, and Pigeons, and even deprives lambs of their eyes. In fact, the Crow has scarcely a friend among the rustic population of this country; every man's hand is lifted against it, and its body is frequently seen nailed as a trophy to barn-doors, with those of the Fox, the Pole-cat, the Weasel, and the Hawk. The Crow generally builds its nest in solitary woods, and lays four or five eggs.

The Raven, according to a classic fable, was once white; but Apollo compelled him to assume mourning as a punishment for being the bearer of some unpleasant tidings. It is still said to be a bird of evil omen; but is, nevertheless, frequently domesticated, and taught to utter words. It is described as possessing "many diverting and mischievous qualities; active, curious, sagacious, impudent, and mischievous; by nature a glutton; by habit a thief; in disposition a miser; and in practice a rogue." The Raven, however, evinces an extraordinary degree of attachment to its nestlings. Mr. White, in his 'Natural History of Selborne,' mentions a large oak, on the topmost branches of which a pair of Ravens had, for a series of years, fixed their residence; at length the day arrived when the wood was to be levelled. "It was in the month of February, when Ravens usually sit; the saw was applied to the butt—the wedges were inserted in the opening—the woods echoed to the blows of the beetle, or mallet—the tree nodded to its fall—but still the dam (the mother Raven) sat on; at last, when it gave way, the bird was flung from her nest, and though her parental affection deserved a better fate, was whipped down by the twigs, which brought her dead to the ground." Ravens live to a great age; they feed on carrion and small birds, and build on high trees or solitary eminences.

The Jackdaw is much less than the Crow. The birds of this species are gregarious; they build about old, ruinous buildings, and are especially partial to church-towers, and feed on insects, fruit, grain, nuts, &c. The Jackdaw, like the Magpie, the Jay, and the Raven, is often domesticated, and taught to articulate. A very absurd custom prevails of slitting the tongues of these birds, under a mistaken idea of thus improving their powers of imitating human speech.

In days long past, as we well remember, one of those fine rocks

—which, before they were quarried out to pave the streets of Bristol, rose almost perpendicularly from the banks of the yellow Avon—was the abiding place of innumerable Daws; they built in its clefts and crannies, wholly inaccessible to the foot of man, behind a veil of ivy and other creeping plants. But the boys of Clifton, at that time, frequently lowered one of their companions by a rope from the summit of the stupendous rock, who, with a couple of satchels slung over his shoulders, robbed the nests as he dangled in the air, and descended to the bank below heavily laden with the eggs and nestlings of the Daws. The writer of these pages has frequently indulged in such freaks, thinking them, at that time, matters of little moment. A troop of boys from Bristol once, in his presence, essayed this perilous feat. They fixed an iron bar in the turf at the top of the rock, wound a rope round it, and slung the boy, who was to descend by one end of it, in the usual manner. The youth went over the edge of the rock, and had descended thirty or forty feet, when those above, whose duty it was to hold the other end of the rope, and let it out by degrees, perceived the bar, round which for safety's sake it was wound, moving in the turf. One of them quitted his place to fix the bar more firmly; the others immediately, in a state of extreme terror, dropped the rope; the boy who was descending suddenly felt it slackened; he uttered one shriek, fell like a log upon the rocky bank below, and was dashed to pieces. Strange to say! his fate did not deter others from following the same pranks; within a week, a bar was fixed in the same turf, and a boy descended that identical rock, in quest of eggs and nestlings, as if nothing had happened.

The Magpie is petulant, voracious, and thievish; he refuses scarcely any kind of food; he will rob the nests of other birds of their eggs, and "a maimed Lark, or chicken separated from the hen, are to him sure objects of spoil." He is impudent and swaggering, without being courageous; and not only steals his food, but articles that are of no use to him whatever; like the youthful miser, he frequently puts his treasures in such places, that he actually conceals them from himself. The Magpie's nest is made of thorns dexterously interwoven, with a hole at the side for admittance, and furnished with a lining of wool and other soft materials; the hen lays six or eight eggs of a pale-green colour, with black spots.

"The thievish Jay" is one of the most beautiful of British birds; its belly, breast, neck, and back are light reddish brown, tinged with gray, and the greater wing-coverts beautifully barred with black, blue, and white. Jays feed on acorns, berries, and fruit; but they do not restrict themselves entirely to a vegetable

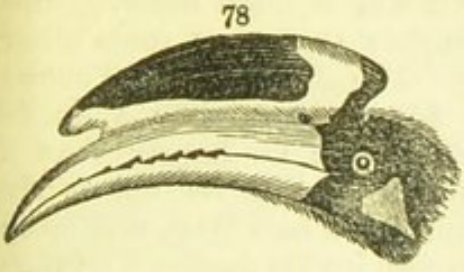
diet, as they will sometimes destroy chickens, and even carry off birds that have been caught in traps or with bird-lime. The Jay is exceedingly restless and noisy, "frequently depriving the anxious gunner of his intended prey, by alarming too soon his destined victim; for the moment it espies a person, it sets up a harsh, chattering scream, whereby its associates, and all others, know that an enemy is near." The Jay's nest is composed of roots and twigs; it builds in woods, and usually lays five eggs of a dull-white colour, marked with brown. The young remain with the old birds until the pairing time. (Fig. 77, the Jay.)

77

Rooks are well-known birds, but they are not so numerous as they formerly were; for in times gone by almost every mansion possessed a busy, clamorous city of Rooks among its stately avenues or encircling belts of lofty elms; and it was pleasant to see the Rook winging homeward at dusk to his habitation, "far, far away"—to hear the many tenants of a tree clamour, even after it was dark, as if on account of the late arrivals of some of the family arrangements had not yet been made for the night—to watch an old Rook march, solemnly as an undertaker at a funeral, after the plough, and ever and anon appear to condescend to pacify his appetite, by gobbling up one of the larvæ of the chafer, which had been turned out by the share. Although petulant and quarrelsome at times, and however a Rookery may be disturbed by intestine broils, there is a great deal of moral dignity about these birds. They bicker egregiously, even with a female Rook, on ordinary occasions; but no sooner does she lay, than all her neighbours treat her with the greatest respect, and suffer her to pursue the labour of incubation perfectly unmolested. Should a stray Rook enter a community, he is immediately set upon and expelled; by this the Rooks at once prove that they have a considerable portion of sagacity, and are totally deficient in the laudable virtue of hospitality. They begin to build about the latter end of February; and it is truly amusing to observe the cunning they exhibit, and the contests that occur among them, to obtain possession of a twig. We have frequently seen the labours of a pair of young Rooks for many days demolished, and every atom of the nest carried off, in as many minutes, while the industrious and innocent pair, as yet unversed in the ways of Rookeries, were both at some little distance, eagerly intent on increasing their little store of sticks.

Hornbills (Buceridæ).—This family consists of birds of very large size, distinguished by the excessive size of their beaks, which are often still further remarkable for some kind of large prominence on the upper mandible (fig. 78, beak of Hornbill). The purpose of this strange appendage, which is exceedingly light, and cellular internally, is quite unknown. These birds are confined to tropical climates, where they live upon fruits, and, according to some writers, also upon carrion. They breed in holes of trees, which they enlarge to suit their purposes. When they fly in flocks, the movement of their wings through the air causes a considerable noise, and at the same time they keep up a constant clattering with their bills. The Rhinoceros Hornbill is as large as a small Turkey, but is more slender in its shape; the tail is white, crossed by a black bar; the rest of the plumage is black. It is principally found in the East-India Islands.

78

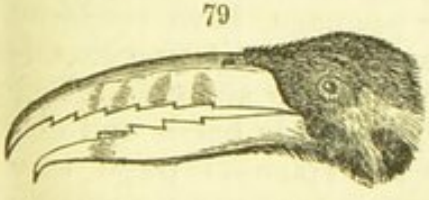


SCANSORIAL BIRDS.

The Scansorial or Climbing Birds are distinguished from the Passerine Birds by the position of their toes, of which two are directed forwards and two backwards. In other respects they present much diversity in their characters, some of them very closely resembling the Passerine Birds, whilst others, such as the Parrots, appear to stand quite alone. The birds referred to in this order are the Toucans, the Parrots, the Woodpeckers, and the Cuckoos.

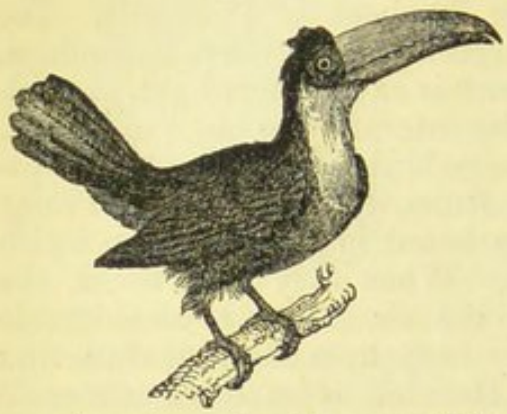
Toucans (Ramphastidæ).—The characteristics of this family are, a large convex bill, serrated at the edges, and both mandibles bent at the apex (fig. 79, beak of the Toucan), the edges of the tongue feathered, and the feet formed for climbing. There are several species of Toucans; they are all natives of South America, and their habits and general conformation are nearly similar, though they differ in size and colour. They feed on vegetables, fruits, and berries, and also occasionally upon small animals. The bill, although so prodigiously large, is not formed for a weapon of attack, being so exceedingly thin, that it has been termed a mere case for the tongue, with which the bird takes its food and forms its nest.

79



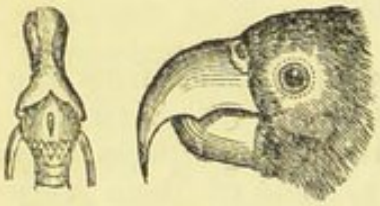
The nostrils are placed in a black line running round the base of the bill, and are nearly covered with feathers: this, says Edwards, occasioned our first naturalists to say it was without nostrils, and set them on straining their wits to supply that want some other way. The Red-beaked Toucan (fig. 80) is shaped like a Jackdaw; though no bigger than a Common Pigeon, its bill is six inches and a half long, and more than two inches deep. The plumage on the throat is white; there is a dash of fine red on the breast; the coverts under the tail are also red, and those above yellow; the other parts are black; the claws, feet, and legs are ash-coloured; the mandibles are partly red and partly yellow, the base of the lower one is purplish, and its point black.

80



Parrots (Psittacidæ).—This family contains a great number of species: the distinguishing characters are, a hooked beak, the tongue obtuse and fleshy, the nostrils situated in a cere at the base of the beak (figs. 81 and 82, tongue and beak of the Parrot).

81 82



These birds are inhabitants of the warm regions of Asia, Africa, America, and Australia; their chief food in a natural state consists of fruits and berries, and their mode of feeding is singular; they hold what they are about to eat in their claws, and in bringing it to their mouths turn the foot outward; while doing this, the bird stands on its other leg. The Parrots use their bills in climbing as well as in feeding.

The power possessed by birds of this genus of imitating the human voice, and the beauty of their plumage, have rendered them great domestic favorites. Their faculty of imitating sounds is almost as great as that of monkeys in mimicking actions. Their natural notes are, for the most part, exceedingly harsh and discordant; so that, however imperfectly the splendid pupil may copy the tones of its mistress (and a Parrot's teachers are usually females), it is a much more agreeable companion than an untaught bird of this genus, which can only scream "its native wood-notes wild." Goldsmith remarks, that in going through France, he could not help remarking how much plainer the Parrots there spoke French, than those in his own country spoke English. He was inclined to ascribe this to the different qualities of the two

languages; but a friend set him right, by assuring him that the French women scarcely did anything else the whole day but instruct their pupils, and that this constant schooling made the birds perfect in their lessons.—In this family are found the gorgeous Macaws, which, for splendour of plumage, may claim precedence of nearly all the feathered tribe. One of the finest of the group is the Blue and Yellow Macaw (fig. 83): the upper parts of its body are of a most exquisite glossy and sparkling azure, the under parts are of a rich and vivid yellow; the cheeks are marked with three lines of small black feathers on a white ground, and tinted with flesh colour; the throat is ornamented with a fine stripe or collar, of a greenish black; and the feathers on the head are of a green hue, partaking, in a considerable degree, of yellow. The Great Green Macaw and the Deep Blue Macaw are scarcely less beautiful; and even some of the Common Parrots, although inferior to the magnificent Macaws in size, are certainly not so in splendour of plumage.

83

The Cockatoos, in a state of nature, like the other birds of this genus, live upon vegetable substances and seeds: they are distinguished by an elegant crest of feathers, often of a different colour to the rest of the plumage, and which may be raised or depressed at will. There are several species of these birds. The largest and finest species are natives of Australia, from whence comes the Great Sulphur-crested White Cockatoo. The Small Sulphur-crested Cockatoo is found in the Molucca Islands. These are the species commonly seen alive in this country.

The Paroquets are less than the Common Parrots; some of the varieties are of very brilliant plumage; their tails are long; and they are principally natives of the East and West Indies. Among those most generally known are the Ring Paroquet, the Red-breasted Paroquet, and the Large Paroquet.

The Lories are also included in this family; there are several species of them, among which the Scarlet Lory is the most remarkable for beauty of plumage.

Woodpeckers (Picidæ).—Woodpeckers are found in various parts of the world: they live on insects, in search of which they are generally seen climbing up and down trees. They are admirably calculated for their mode of life; the foot of the Woodpecker is scansorial (fig. 84);

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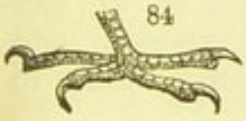
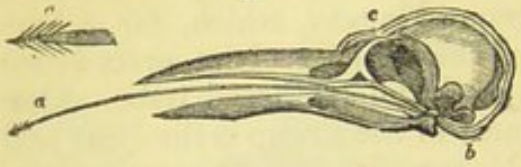


its tongue is long and slender, its point (fig. 85, *a*) is sharp and barbed; it is furnished with a powerful set of muscles, affixed to two long, slender, and elastic processes of the os hyoides, or bones of the tongue, which, passing backward close to the articulation of the lower mandible (*b*), encircle the back part of the head, and terminate (at *c*) on the frontal bone. By means of this curious apparatus, the bird has the power of darting its tongue into clefts and crevices of great depth, where it transfixes the insects on which it feeds. It is also capable, by means of its bill, which is sharp, strong, and pointed, of boring holes in trees. The tail is composed of ten remarkably stiff and sharp-pointed feathers (fig. 86); these are bent inward, and the bird supports itself upon them when climbing, or clinging to the trunks of trees. Nearly all the Woodpeckers lay their eggs in holes formed by the birds' bills, except those of Guinea and Brazil, which suspend their curious habitations from slender boughs, "where neither the mischievous monkeys, nor the numerous snakes, which, in vain, wreath their terrific forms round the trunks below, can possibly reach them." It is worthy of observation, that the Woodpeckers in other parts of the world do not even line the holes, in which they lay their eggs, with feathers, wool, or any material whatever.

85



86

Their are many species of this family. Buffon, in his account of the Yellow Woodpecker of Cayenne, says, that the natives call it the Yellow Carpenter. There is also a three-toed Woodpecker, having two toes before and one behind: both of these birds, like most of the genus, have fine plumage. The Green Woodpecker is a well-known English species: it is called, in several parts, the Laugher, from its making a noise very much like laughing, "particularly before the welcome showers of spring." The Carolina Woodpecker (fig. 87) is rather less than the Green Woodpecker; the top of its head and neck is of a beautiful scarlet colour, the breast is olive, the belly reddish, and the back, wings, and tail black, with markings of light brown and white. The smallest species is a native of South America, and about the size of a Wren. The Wryneck, a summer visitor to this country, also belongs to this family.

87

Cuckoos (Cuculidæ).—Of all the species of this genus, the Common Cuckoo alone visits this country. The general characters are, the bill small and smooth, tapering and arched; the tongue short, entire, membranaceous, and terminated by hairs; and the feet scansorial (figs. 88 and 89, beak and foot of the Cuckoo). A very distinguishing mark of the Common Cuckoo is the roundness and prominence of its nostrils.

88

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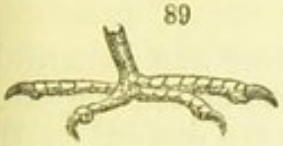


In shape, the Common Cuckoo (fig. 90) is something like a Magpie, and rather less in size than a Pigeon; the head, the upper part of the body, the wings, and tail, are finely marked with black and tawny stripes; the ground-colour of the body is gray; there are a few white spots on its head, and on the exterior edges of the feathers of the tail: its legs are short and yellow. The Cuckoo is a bird of passage, arriving in this country about April; his curious note is heard in the woods from May to July, soon after which it again takes its departure for a warmer climate. It would appear from the statements of some naturalists, that the Cuckoo does not always deposit its eggs in the nests of other birds, although this seems to be its general custom.

90

The species of this family are numerous; one of them, the Honey Cuckoo, is very singular in its habits. It is found in the interior of Africa; "it indicates to honey-hunters where the nests of wild bees are to be found. It calls them with a cheerful cry, which they answer; and, on finding itself recognised, flies and hovers over a hollow tree containing the honey. While they are occupied in collecting it, the bird goes to a little distance, where he observes all that passes; and the hunters, when they have helped themselves, take care to leave him his portion of the food. This is this *Cuculus indicator* of Linnæus, otherwise called the Moroe, Bee-Cuckoo, or Honey-Bird."

It seems probable, however, that the bird in its endeavours to get at the honey betrays the situation of the store to the Hottentots, and that the older writers, to whom we are indebted for the preceding account, have somewhat exaggerated the facts.

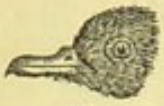
The note of this bird bears no similarity to that of the European Cuckoo. In Dr. Spelman's account, we find it stated, that in the morning and evening, when the bird feeds, it is heard calling, in

a shrill tone, "Cherr! cherr!" It is also remarked, in a note to Buffon, that, according to some travellers, the cry of this bird is "Wicki! wicki!" and that this word signifies honey in the Hottentot language.

COLUMBINE BIRDS.

In form and plumage these birds are elegant and beautiful; their legs are short, generally red, and, in some of the varieties, covered with feathers; the toes are divided to the origin; the bill is weak and slender (figs. 91 and 92, beak and foot of Turtle Dove); the nostrils are placed in a fleshy protuberance at the base of the bill.

91



92

The general characters of the order may be studied upon any of our domestic Pigeons, but at the same time the varieties presented by the latter are very striking. The Tumbler, the Carrier, the Fantail, and the Pouter, not only differ in form, but habits. It is the pride of the Pouter to fill his enormous crop with air, and to stand so upright, that he often falls backward. The Fantail delights in curving its neck over its back, and spreading out its tail like a Peacock. The Carrier is remarkable for returning home from great distances; and the Tumbler owes its name to the circumstance of its frequently tumbling backward, or throwing itself completely over, when on the wing. The legs of the Ruff, the Jacobine, and the Pouter are covered with feathers; those of the Tumbler, Carrier, &c., are naked. The Horseman, Dragoon, and Carrier have enormous wattles on their beaks and round their eyes; and their heads differ materially, in other respects, from those of the Tumbler and most other Pigeons. Some of the varieties are adorned with a ruff, or frill, of inverted feathers, down the neck; others have a small tuft, or crest, on the back part of the head; while the greater portion are entirely destitute of any such appendage. They vary much in size; and their plumage partakes of almost every shade of colour, the result of domestication and frequent intermixtures.

The Pigeon forms a rude nest of sticks, straw, roots, &c.; she lays two white eggs, and sits fifteen days after the second egg is laid; the cock and hen both incubate, and share in the task of feeding the young. For this purpose, the crops of both the male and female are endowed with the singular power of producing a fluid, which coagulates into a sort of curd; with this the young birds are, at first, entirely fed; and common food is mixed with it, by degrees, until the nestlings are capable of subsisting entirely on the latter.

The best food for Pigeons is tares, small horse-beans, peas, and

barley; they must be afforded a constant supply of water; and each pair ought to have two nest-holes within one square, or partition. Small pans of earthenware, or straw baskets, are frequently placed in the partitions, for the more valuable kinds of Pigeons; in these the birds make their nests; or, if they be careless in this particular, which is often the case, a little hay or soft straw is placed in the pan previously to their laying, in order that the eggs may not be broken.

The greater part of the species belong to the family of *Doves*, or Columbidæ, of some of which we shall now proceed to give our readers a short account.

The Turtle Dove is about twelve inches only in length; the greater part of its plumage is of an ash colour, mixed with brown; there is a spot of black feathers, tipped with white, on each side of the neck; the breast and front of the neck are of a fine light purple, dashed with red; the lower parts of the body are white; the eyes are yellow, and encompassed with a circle of crimson. Turtle Doves are often kept in cages and aviaries. In this country they have only one brood in the year. They are migratory birds, arriving here late in the spring, and departing early in the autumn. They build their nests in the most retired parts of woods, on the tops of high trees; and their young are strong enough to accompany them when they depart from our shores to pass the winter in a warmer region (fig. 93, the Turtle Dove).

93

The Ring Dove is much larger than the Turtle Dove; its plumage is principally of a faint blue, or ash colour; the tail feathers are tipped with black, and most of the greater quills of the wing edged with white; a white line extends to some distance from the point of the wing. The hinder part of the neck is ornamented with glossy plumage, of a variable hue, in the centre of which there is a line or dash of white. The Ring Dove is found in all parts of Europe; its nest is composed of twigs, and it is generally supposed that it produces two broods in the year.

94

The Wild Pigeon, or Rock Dove (fig. 94), exhibits a variety of beautiful hues in its plumage; deep blue, brilliant green, purple, gold, ash, pale red, &c. It builds in the holes of

rocks, and similar places, and commonly has two broods in a year. In a domestic state these birds hatch several times in the course of the season; and their increase is so enormous, that it has been calculated the produce of a single pair, at the expiration of four years, may amount to nearly fifteen thousand. Their enemies are, however, so numerous and powerful, and the young ones are liable to so great a number of casualties, that the produce of a pair of these birds, for many years, would fall immensely short of the number mentioned. Common Pigeons are not considered of sufficient beauty or value to be admitted to the Aviary; but great numbers of them are reared in Dove-cotes, and suffered to go at large and support themselves.

The first remove from the Common Pigeon is the Runt; a very large bird, possessing no great beauty of plumage. There are several varieties of the Runt, one of which is remarkable on account of several feathers which grow from the outside of its feet; and another for having its plumage inverted, or turned contrary to the usual direction: there is a peculiarity somewhat similar in that of the Frillback, which is raised or curled up at the ends, so that each feather forms a singular kind of hollow in its centre.

All Pigeons have a peculiar property, in a greater or less degree, of inflating their crops with air, but none to such an enormous size as the Pouters (fig. 95, the English Pouter, or Pouting Horseman). These birds are frequently from seventeen to eighteen inches in length; their bodies are thin, and tapering from the shoulders downward; their legs are strong, straight, and covered with soft, white feathers. The front of the crop, the under parts of the body, and the tips of the wings, are usually white; there is also, generally, a white spot near the point of each wing; the remainder of the plumage is usually of one uniform colour—yellow, red, blue, or black, except round the white spot on the crop, where the feathers are of a brilliant green or purple. These birds are exceedingly difficult to rear, on account of the carelessness of the old ones; for this reason, their eggs are generally hatched, and the nestlings brought up under some other Pigeon.

95

The Uploper, the Dutch Cropper, the Parisian, and other kinds of Pouters, possess nearly the same peculiarities as the Pouting Horseman.

The Carrier is the most celebrated of all the birds of the Pigeon tribe. The accounts which have been given of its immense flights, in early times, might be deemed fabulous, if they were not only well authenticated, but supported by facts which frequently occur in our own days. The Carrier Pigeon has been made use of for ages, to carry intelligence from one place to another. Although taken to a great distance, as soon as it is set at liberty, after making several wide circles high in the air, it returns home with astonishing velocity; and may thus be made the bearer of news, by means of a small letter fastened to its neck, leg, or elsewhere, from the persons who set it free, to those who are at its native place. It will perform a journey of forty or fifty miles in as many minutes; and, when properly trained, will return to its home, with nearly equal speed, even from much greater distances. Numerous instances are recorded of these birds having been employed to convey important information from besieged towns. Hirtius and Brutus corresponded with each other, by means of Pigeons, at the siege of Modena. Taurosthenes gave notice to his father at Ægina, of his victory at the Olympic games, on the day he gained it, by a Pigeon stained with purple. A late writer states, that "the Turks and Persians make a common practice of breeding this sort of Pigeon in their seraglios, where there is one whose business it is to feed and train these birds for the use afterwards designed, which is done in this manner; when a young one flies very hard at home, and is come to its full strength, they carry it in a basket, or otherwise, about half a mile from home, and then turn it out; after this they carry it a mile; then two, four, eight, ten, twenty, &c.; till at length it will return from the furthest part of the kingdom. This practice is of admirable use; for every bashaw has generally a basket full of these Pigeons sent him from the grand seraglio; and in case of any insurrection, or other emergent occasion, he braces a letter under the wings of a Pigeon, whereby its flight is not in the least incommoded, and immediately turns it loose. But for fear of its being shot, or struck by a Hawk, they generally despatch five or six; so that, by this means, despatches are sent in a more safe and speedy manner than could possibly be otherwise contrived."

A similar mode to that above described, has always been adopted to train the Carriers; if they be not accustomed, by degrees, to find their way home from a distance when young, and gradually exercised so as to support long flights, the quality for which they are so celebrated will exist but in a very trifling degree: other Pigeons possess it; but they can never be trained to fly with such speed and certainty, nor from such a distance, as the Carrier, if we except the Horseman and the Dragoon, which are Pigeons nearly allied to it.

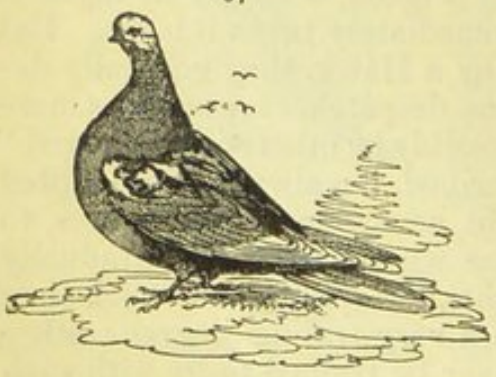
The Carrier is larger than the Common Pigeon: the plumage

is generally either black or dun colour; its neck is long, tapering, and well shaped; its breast is broad; the head and beak exceed in length those of most other pigeons; and its appearance altogether indicates strength and activity. The wattles on the beak and round the eyes are very remarkable: those in the Horseman, which, perhaps, is a half-bred Carrier, are rather less in size; and in the Dragoon, which is, probably, another remove from the pure stock, they are not so large as in the Horseman. Among many facts, which may be depended on, relative to the extraordinary qualities of the birds of the Carrier kind, we select the following: A gentleman sent a Dragoon by the stage-coach, from London, to a friend at St. Edmund's-bury, with a note, requesting that the Pigeon might be set at liberty two days after its arrival, precisely at nine in the morning. The person at St. Edmund's-bury punctually attended to this request; and the Pigeon arrived in London at half-past eleven o'clock the same day; thus having performed a distance of seventy-two miles in two hours and a half. (Fig. 96, the Carrier.)

96

The Tumbler is a small Pigeon, with a thin neck, full breast, round head, and small beak. The eyes of the better sort of Tumblers are usually of a fine pearly hue. These birds display a variety of beautiful colours. The Almond, or Ermine Tumbler, is particularly conspicuous for the richness and variety of tints of its plumage. The head, tips of the wings, and tail, of the Bald-pated Tumbler (fig. 97) are white. There is another variety called Bearded Tumblers; the plumage of these is either blue or black, except on the upper part of the throat and the cheeks, which are ornamented with a dash of white. The Tumblers are very excellent birds for flying: they possess a peculiarity, to which we have already alluded, of throwing themselves completely over when in the air, and in an instant resuming their flight. They are very hardy birds, and may be classed among the prettiest of the Pigeon tribe.

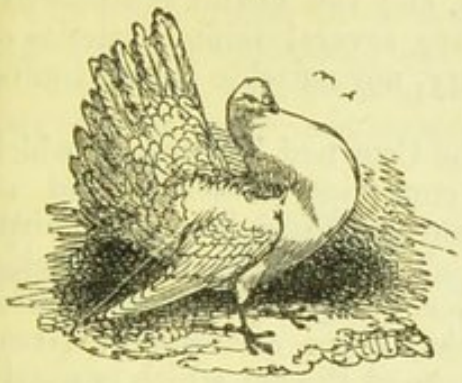
97



The Fantails are particularly elegant birds: they have a frequent, peculiar, tremulous motion in the neck; from this circum-

stance they are sometimes called Shakers. The tail of these birds is spread out, and so raised, that it nearly touches the head. The Fantail has a full projecting breast, a thin neck, and a very small beak. It is generally supposed that these birds are always white: this is not the case, as there are Fantails of various colours. The white birds are, however, not only the most common, but, deservedly, the greatest favorites. There is a variety of the Fantail, called the Narrow-tailed Shakers, the necks of which are shorter and thicker, their backs longer, and their tails, as the name imports, narrower than those of the true Fantails. (Fig. 98, the Fantail.)

98



Some varieties of the Pigeon tribe are distinguished by a crest on their heads; others, by a ruff of inverted feathers about their necks; and a few, by a tuft on the breast; of each of these we shall give one or more examples.

The heads of the Helmet and the Nun are ornamented with a fine tuft of feathers, which, in the former, are supposed to bear some slight resemblance to a helmet; and in the latter, to a veil: hence, it is supposed, their names are derived. The Nun is a very pretty little Pigeon: the head, tail, and ends of the wings are usually red, yellow, or black; the veil, or tuft, and the rest of the plumage, white: in this particular the Helmet resembles the Nun. The Barb Pigeon is generally dun, or black; its beak is short, thick, and the base of its upper mandible covered with a small wattle; there is also a wattle, or circle of knotted skin, of a strong red colour, round the eye. Some of these birds have a tuft, slightly resembling that of the Helmet (fig. 99). Among the ruffed Pigeons, the Jacobines are most conspicuous: they are small in size, and vary in colours, but those of a fine yellow are supposed to be of the greatest value. Whatever may be the prevailing hue of the plumage, the head, tail, and tips of the wings are generally white; the legs of many of these birds are covered with feathers to the toes. The Ruff and the Capuchin have a hood, or frill, similar in form to, but not so large and handsome as that of the Jacobine.

99

The Pigeons called Owls, and the Turbits, have a remarkable tuft of feathers on the breast, the shape of which, by some writers, has been compared to the frill of a shirt; and by others, to a full-blown rose. The Owl is rather less, and the Turbit is somewhat larger, than the Jacobine. There are several minor varieties of Pigeons, which it is neither necessary, nor suitable to our limits, to notice.

Crowned Pigeons (Gouridæ).—The Crowned Pigeons, of which several species occur in tropical countries, evidently lead us towards the Gallinaceous birds which constitute the following order. The best-known species is the *Goura coronata*, or Great Crowned Pigeon, which is nearly as large as a Turkey; the greater part of its plumage is of a fine purple, or bluish ash colour; the middle of the back, and the coverts of the wings, are of a dark reddish brick colour; these together, says Edwards, form a kind of saddle across the upper part of the bird: some of the first row of covert-feathers, above the quills, are white, with red tips; the remainder of the row is ash-coloured. The eye is of a beautiful red, and placed in the centre of a broad space of black, which passes backward from the upper mandible, and ends in a point near the hinder part of the head. The head is adorned with a remarkably handsome crest of a pale blue, or ash colour, similar to that of the lightest parts of the Common Pigeon, and composed of a number of fine feathers, with slender shafts and fine webs, which are usually elevated. The bill is black, and the end of the upper mandible overhangs the point of the lower. The legs and feet are of a whitish colour, spotted with red. This splendid bird is a native of the East-India Islands: it cooes, and has the peculiar actions and manners of other pigeons. (Fig. 100, the Great Crowned Pigeon.)

100

We may add, that according to the recent researches of Messrs. Strickland and Melville, that curious extinct bird, the Dodo, belonged to the Columbine order; we have, however, thought it best to leave it, in the present essay, amongst its old associates, the Struthious birds.

GALLINACEOUS BIRDS.

The Gallinaceous birds are such as are allied, in many particulars, to the Common Fowl. They are careless in the structure of their nests, and lay a great number of eggs. Their food consists of grain, seeds, and insects. To this order belong the Common Fowl, Pheasant, Turkey, Partridge, Quail, and other birds of similar habits. Their bills are convex, rather short, and strong; the upper mandible closing over the edges of the lower. Their feet are formed for scratching, and the toes usually connected by a membrane, as far as the first joint (figs. 101 and 102, foot and beak of Partridge).

101

102

Pheasants (Phasianidæ).—The family of the Pheasants includes the most beautiful species of Gallinaceous birds. The Common Pheasant, the Gold and Silver Pheasants, and the Peacock, belong to it, besides many other splendid-plumaged birds of the East Indies. Several of our most valuable domestic birds are also Phasianidæ. The Pheasant is said to be so called from Phasis, a river in Asia, whence it was first brought. In some parts of England a variety is found with a fine white ring round the lower parts of the neck. There is another sort with plumage as white as snow, and which, it is said, does not associate with the common birds; this we are inclined to think is an error; for, in those tall and stately woods—in which we passed our holiday hours in the spring-time of life, robbing the provident squirrel of all the hazel-nuts in his winter hoard (to the shame of our youth be it spoken)! or setting wire nooses, as poachers do for hares, to catch the lazy adder, in order to enrich our miniature museum with his fangs—beneath the old oak, or graceful beech, that "lady of the woods"—have we, more than once, flushed a hen Pheasant, white as a pearl, with a motley brood about her; some of them without even a feather in their plumage by which they might claim kin to the attentive mother-bird, under whose wing they had been nestled. Several species, of extraordinary brilliancy of plumage, including those admirable birds, the Gold and Silver Pheasants of China, are frequently kept in Aviaries, of which they form a most distinguished ornament. The Peacock Pheasant, or Iris Pheasant of Latham (fig. 103), is described by Edwards as being one of the greatest beauties in nature. We may compare it, he says, to sable, thickly set with shining jewels of various colours. Buffon has denominated it the Eperronnier, from the singular fact of its having two spurs on each leg.

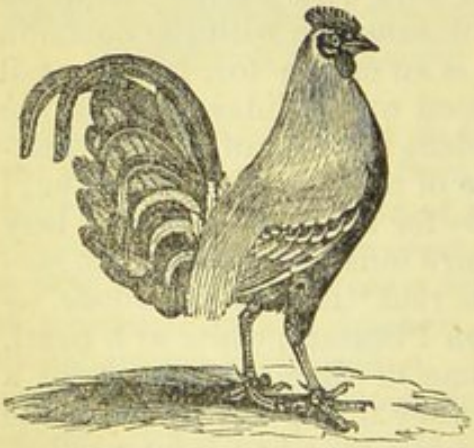
In a state of nature Pheasants are very attentive to their broods,

but they become careless if confined; it is usual, therefore, to place the eggs under a common hen, and to suffer her to bring up the young birds when hatched. They should, if possible, be moderately supplied with the larvæ of ants, with earwigs, and other small insects: when grown up they may be fed on acorns, wheat and other grain, and berries. Young Pheasants are often kept under large nets, stretched over a group of shrubs, in parks or pleasure-grounds; and in such situations, if properly fed, attain a size and plumage almost equal to those of the wild ones. The male crows like the Common Cock; and the female lays her eggs, which are generally from ten to fifteen in number, in a rude nest of dry grass, or roots, on the ground.

103

Common Fowl (Gallus).—Several species of this genus are found in a native state in the jungles of India: however beautiful our own chanticleer may be (see fig. 103*), the wild birds, in their native climes, exceed him considerably in splendour of plumage. The original stock of most of our domestic varieties is commonly supposed to be the Javanese Jungle Fowl; but it is of course difficult, if not impossible, to decide this point with certainty, and it seems equally probable that our Domestic Fowls may be either a distinct species, or a mixture of two or more. Several varieties of these most useful birds have been imported from different countries, to enrich and embellish our farmyards; they are to be found in almost every part of the world; every country and frequently even districts of the same country, producing different kinds. These innumerable distinctions are, doubtless, to be attributed to their having been so long under the dominion of man, in all the climates of the earth In some of them the combs, even of the hens, are so large, that they fall over the eye, on one side, and reach below the chin; in others we find a crest, or top-knot, with a very small comb; a third sort have all the feathers reversed, or apparently ruffled upward;

103*



a fourth is entirely destitute of a tail; a fifth, the Dorking breed, "much-loved" of poulterers, has five toes on each foot (fig. 104, *a*), instead of four (fig. 104, *b*); the comb of a fifth is small and thin, while that of a sixth is broader than the head. The Bantams were at one time considered valuable only when feathered to the points of the toes, although it is now the fashion among Bantam fanciers to have the legs of these little favorites quite free from plumage. One species of very fine Fowls, which are called (we know not with what propriety) Spanish Fowls, occasionally change, in a single moulting, from jet black to speckled; and, as we remember in two cases which have fallen under our own observation, to perfect white. The Negro Fowl is a very singular variety, for not only the plumage, but the comb, wattles, and even the flesh, are entirely black. The legs of most of the varieties of the Cock are armed with sharp and powerful spurs (fig. 105, foot of Jungle Cock).

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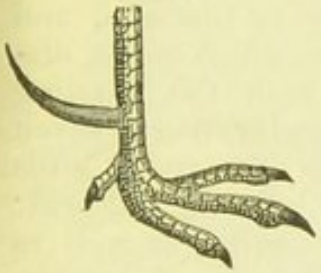
105



The ancients were frequently governed in their actions by auspices derived from birds. The site of the city of Rome was decided on by a flight of Vultures. In after times, a number of chickens were cooped up, in state, which, previously to "the masters of the world" embarking in any great undertaking, were very solemnly set at liberty, and a handful of grain placed before them by the *Pullarius*, or keeper. Their eating freely was considered as an omen of good fortune; but if they refused to feed, no hopes of success were entertained; and the projected enterprise was thus entered into with ardour or abandoned in despair, according to the appetite manifested by the sacred poultry. Superstitions, equally singular and ridiculous, still prevail among our own peasantry. It is accounted unlucky, in many parts of England, to hear a Cuckoo before breakfast. In other places, a person who destroys a Martin's nest, or kills a Robin, is supposed to be in great danger of breaking a limb before he is a year older: "an opinion which might possibly arise from the confidence these birds (the Martins) put in us, by building under our roofs, so that it is a kind of violation of the laws of hospitality to murder them." The sight of a single Crow has often induced the peasant to turn back, and postpone the business on which he was bent until another occasion. Geese, as it is well known, generally go from the poultry-house to the pond in the morning, and back again in the evening, in a regular line—the proud and pompous gander waddling, with ludicrous gravity,

at their head; if, contrary to their usual custom, they go homeward two and two, a funeral in the neighbourhood is confidently expected.

Peacock (Pavo).—This genus occupies a very distinguished place among the GALLINÆ. The head of the Peacock is ornamented with a crest of slender feathers, the colour of which, as well as that of the throat, neck, and breast, is a fine golden-tinted green; the other parts of the plumage either partake of the same tints, or, by their sober hue, afford a contrast which enhances the beauty of the head and train. The female, which is not distinguished by any of the dazzling plumage of the cock, lays five or seven eggs, and sits from twenty-five to thirty days. The young birds are very difficult to rear, and do not shine forth, in the full pride of crest and train, until the third year. Peacocks, as well as Pheasants, are occasionally seen entirely white; and, as is also the case with the latter birds, the hen Peafowl, after they have ceased laying, sometimes acquire the plumage of the cock.

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Peacock (Pavo).

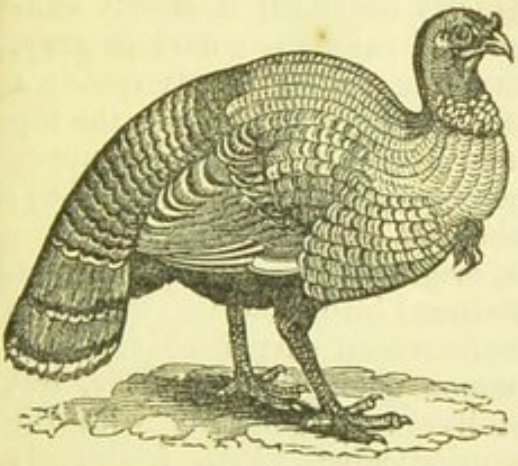
As an ornament of the park and the pleasure-ground, the Peacock stands unrivalled; its form is graceful, its motions elegant, and its plumage exquisite; but, on the other hand, its voice is hideous, its appetite voracious, and its disposition quarrelsome. An object more splendid than the Peacock, proudly expanding its gorgeous train, and apparently delighting in the admiration of its beholders, it is difficult to conceive: "his pace is slow and solemn, and he frequently turns slowly and gracefully round, as if to catch the sunbeams in every direction, and produce new colours of inconceivable richness and beauty." What a pity it is that so noble, so admirable a bird, should be debased by its capricious gluttony and unsociable temper! Its natural food is grain, seeds, and insects; but of these it will destroy, if an opportunity occur, even more than it can eat. Fond of roaming from its allotted place of abode, with which it is never satisfied, the Peacock ascends the walls which are intended to confine it, reaches even the tops of the highest houses, and frequently makes the most lamentable ravages in the gardens adjacent. It will root up the choicest plants, nip off the tender buds, and rake seeds out of the ground; it will tear the thatch out of a building; and, in its grave recreations, seems to be, indeed, most ingeniously mischievous.

The Peacock is a native of India. Alexander the Great, when he first beheld these birds, was so delighted with the magnificence of their plumage, as to have forbidden any person to destroy one

of them on pain of death. It is not generally known, perhaps, that the splendid set of feathers, usually called the tail of the Peacock, spring, in fact, from the lower part of the back; the true tail being short, like that of a hen, and serving to support the long and beautiful feathers which compose the train. These feathers, and the crest, constitute the characters of the genus.

Turkey (Meleagris).—The bill of the Turkey is short and convex; there is a fleshy appendage on the base of the upper mandible, which the bird is capable of raising or contracting at pleasure; the head and neck are covered with naked flesh of a reddish-purple hue; the nostrils are pointed at one end, and lodged in a membrane; there is a tuft of black on the breast, and the legs are furnished with blunt knobs, or the rudiments of spurs. The bird has the power of extending its tail, which consists of eighteen feathers, in the manner of a Peacock. Like all other domesticated birds, Turkeys are of various colours—white, black, gray, speckled, &c. In a wild state, the general colour of the plumage is black; in some parts it is of a variable hue, between bronze colour, glossy green, and purple. Turkeys were originally brought from the New World, where they still occur in a wild state. It is rather singular, that the young of these birds, which are so particularly tender and difficult to rear in this country, thrive remarkably well in a state of nature among the wilds of Canada, where the tops of the mountains are, during a great part of the year, covered with snow. The hen Turkey lays from fifteen to eighteen eggs, which are whitish and rather freckled. She begins to lay early in the spring, and is very attentive to her young, but rarely has more than one brood in the year. Ants and their larvæ, and other insects, are the favorite food of young Turkeys.

105**



The Turkey has been very correctly described as being, generally speaking, notwithstanding its furious disposition, a very cowardly bird. We have seen him fly from the common Domestic Cock; and he will do so from almost any animal or bird that has courage enough to face him; but to those who are awed by his important strut, great size, and threatening aspect, he is truly tyrannical. He seems to entertain an especial aversion to lap-dogs: if he have the good fortune, by his outward show of courage, to put one of these, or any other small animal, or a bird—even a

mouse or a sparrow,—to flight, he returns to his hens, "strutting in conscious pride of his valour." A second species, called the Ocellated Turkey, is found wild in Honduras; it is of a fine brassy or coppery-green colour, with a blue eye-spot in each tail-feather.

Pintado (Numida).—The head of the Pintado, or Guinea Fowl, is naked, like that of the Turkey, and it carries its tail pendulous, like the Partridge. Its plumage, although plain when at a distance, is singularly beautiful if closely examined: the general colour is a darkish gray, sprinkled with white, round, pearly spots; a sort of cone-shaped horn ornaments the top of the head, and from the sides of the upper mandible depend two loose wattles (fig. 106); those of the male are rather blue, those of the female red.

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The Guinea Fowl (fig. 107) was, originally, a native of Africa, and thence, in the year 1508, introduced into America, where its numbers increased surprisingly. It is now common among our poultry, but does not live very amicably with the other domesticated birds, frequently disturbing the grave Goose and busy dame Partlet with its loud and unmusical clamour, its petulant sprightliness, and assumption of a dominion which it is incapable of maintaining. Its flesh is very much like that of the Pheasant; it also resembles that bird in many of its habits. The hen lays a great number of eggs, which are of most excellent flavour. In ancient Rome the Pintado was much more highly prized, as an article of luxury for the table, than with us. In the London markets its price seldom exceeds that of a fine fowl.

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Grouse (Tetraonidæ).—The beak of the Wood Grouse, or Cock of the Woods, is convex, hooked, and extremely powerful (fig. 108). The legs are strong and feathered, and the toes are furnished, on each side, with a membrane, the edges of which are strongly toothed (fig. 109, foot of the Wood Grouse). The plumage on the craw is of a lustrous green. The head, lower part of the breast, and belly, are black. The wings are delicately marked with black and gray irregular streaks, on a rich chocolate-coloured ground. The hen is much smaller than the cock, and

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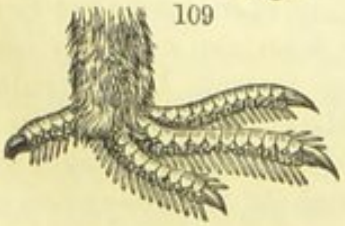

her plumage displays various shades of yellow and reddish brown, mingled, in some parts, with black. The feathers of the belly, scapulars, and tail, are tipped with white.

The Wood Grouse, or Cock of the Woods (fig. 110), is nearly as large as a good-sized Turkey. The immense forests of pine, in some of the northern parts of Europe, abound with Wood Grouse; and thence, during the winter, they are frequently brought to England, where they are now extinct. They feed, principally, on the shoots of pine, fir-cones, and buds of the heather. The female lays from eight to fifteen eggs; and the young birds, as soon as they are hatched, follow the hen; frequently, like those of the Partridge, with portions of the shell adhering to the plumage. The Wood Grouse occasionally elevates the feathers on his head: this, which is a sign of pride in him, is a symbol, which may always be relied on, of fear in the Domestic Cock.

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The Black Grouse (fig. 111) is about one foot ten inches in length, and weighs nearly four pounds; the general colour of the plumage is a rich black; above each eye there is a dash of scarlet, and below the eye a spot of white; the neck and rump are of a glossy blue; the under tail-coverts white, the lesser wing-coverts brown, and the greater ones white; the wing is also barred with white; the feathers of the tail, in the male, form a very singular curve on each side. The toes are toothed on the edges: the eyes are a deep blue, and the bill black. These birds are common in cold countries; they frequent the northern parts of this island, and feed on berries and the young shoots of firs during the winter, and, in summer, on corn. They do not pair, but assemble in flocks. The hen makes a careless nest on the ground, and lays from five to eight yellowish eggs freckled with brown.

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The Red Grouse, or Moor-cock, is about fifteen inches in length; the general colour of its plumage is a mixture of red and black.

Red Grouse are found in great plenty throughout the mountainous parts of England, Wales, and Scotland. They pair in spring, and the female lays from seven to ten eggs on the ground.

The White Grouse, or Ptarmigan, changes the colour of its plumage, in summer, from a pure white to a pale brown colour; in autumn, when it begins to assume its winter livery again, it is spotted with brown on various parts of the body (fig. 112); these spots disappear by degrees, leaving the plumage, in most cases, perfectly white, except that the male has a line of black between the bill and the eyes. The White Grouse is about the same size as the Moor-cock; it is fond of cold situations, and is found in some of the Highland hills, in the Orkneys, &c., and in the most northern parts of Europe. These birds feed on the mountain berries; in winter they fly in flocks, and pair in spring. The hen lays eight or ten white eggs, spotted with brown, on the ground.

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In America, the Ruffed Grouse (fig. 113) is usually called the Pheasant: in size it is about midway between that bird and the Partridge; its plumage is a beautiful mixture of brown and black; the end of the tail is barred with black on an ash colour; the bill is of a brownish horn colour; the legs are covered with fine white feathers; the toes are pectinated, and joined at their bottoms by membranes. Mr. John Bartram has given the following curious account of the Ruffed Heath-cock: "This is a fine bird when his gaiety is displayed; that is, when he spreads his tail like a Turkey-cock, and erects a circle of feathers round his neck like a ruff, walking very stately with an even pace, and making a noise something like a Turkey; at which time the hunter must fire immediately at him, or he flies away directly two or three hundred yards, before he settles on the ground. There is something very remarkable in what we call their thumping, which they do with their wings, by clapping them against their sides, as the hunters say. They stand upon an old fallen tree, that has lain many years on the ground, where they begin their strokes gradually, at about two seconds of time distant from one another, and repeat them quicker and

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quicker, until they make a noise like thunder at a distance; which continues, from the beginning, about a minute, then ceaseth for about six or eight minutes before it begins again. The sound is heard near half a mile, by which means they are discovered by the hunters."

Partridge (Perdix).—In the language of the sportsman, Partridges, exclusively, are termed birds; with him, a Peacock is a Peacock, and Robins are Robins; but he knows of no birds but Partridges. They constitute a material part of the game of this country, and are too well known to require a description of their size or plumage. Our readers may not, however, be aware, that the cock bird has a crescent, of a deep chestnut colour, on his breast, which is never seen on that of the hen. In the Polar regions Partridges become white in winter, and in summer again assume "their livery of brown;" they are found in various parts of the world, and are very numerous in this country. The young birds are strong and lively, as soon as they are hatched; and have, on several occasions, been seen quitting the nest with some of the shell, from which they have partly emerged, sticking to their backs. The Partridge (fig. 114) lays and entirely lives on the ground, except during its brief flights. The eggs may be hatched, and the young birds reared, under a Common Hen; but it is indispensable that they should be supplied with ants' larvæ when young. They must be kept confined under a net or within doors; otherwise they will, as soon as they become a little independent of their foster-mother, take wing, and, quitting the dwellings of man, revel in corn-fields. Partridges mate in spring, and the hen lays from fourteen to twenty eggs.

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The sagacity and affection of these birds for their young has been, not more frequently than correctly, described. If a dog approach the hen, under whose wings the covey is concealed, the cock utters a peculiar note of alarm, and throws himself in the way of danger; he droops his wings, appears jaded, distressed, and scarcely able to keep above a pace or two from the nose of the enemy, running, rather than flying, before him; while the hen either remains close, or retires with her brood to a place of safety.

Quails (Coturnix) are found in almost every part of the Old World. The Common Quail of this country is nearly eight inches in length; its plumage is a mixture of brown, ash-colour, yellow, and black. The hen makes a nest like the Partridge, and lays seven or eight eggs. The Chinese Quails are of so pug-

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nacious a disposition, that they are kept to fight with each other for wagers. They are about the size of Larks (fig. 115). The ancients also kept Quails for the same purpose. A prefect of Egypt was punished with death by Augustus, for bringing to table one of these birds, which had gained a number of victories.

Mound Birds (Megapodiidæ).—These curious birds, which are inhabitants of some of the islands of the Eastern Archipelago and of New Holland, are remarkable for the mode in which their incubation is effected; the eggs are deposited in a heap of vegetable matter, collected for this purpose by the parents, and the heat evolved by the fermentation of this mass, assisted by that of the sun, is sufficient to hatch the young birds. The Australian Jungle Fowl (*Megapodius*) has been known to make a mound of leaves fifteen feet in height and sixty in circumference; and another Australian species, the Brush Turkey (*Talegalla*), is described as accumulating from two to four cartloads of decaying vegetable matter. A pair of the latter species lately bred in the Zoological Gardens, when the male was observed to devote his attention to the eggs, shifting their position, and assisting the newly hatched young on their entrance into the world.

STRUTHIOUS BIRDS.

The Struthious birds, which were formerly placed by some authors with the Gallinæ, and by others with the Waders, are now generally regarded as forming a distinct order; to which some writers give the name of Cursores, or Runners. They are distinguished by the great development and strength of the legs, which compensates, in some degree, for the diminutive size of the wings. The latter organs are quite useless for flight, but in some cases they are employed to assist the bird in running before the wind. These birds are few in number, and generally of considerable size. The best-known species are the Ostriches and Cassowaries; with which are associated the Apteryx, and, by some ornithologists, the Dodo.

Dodo.—The wings of the Dodo are somewhat similar to those of the Ostrich and Cassowary; but in its general appearance it differs from these, and indeed all other known birds. We are, perhaps, incorrect in speaking of the Dodo in the present tense; for it has long been extinct. There is not even a perfect specimen to be found; still no doubts are entertained of its having

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once been in existence. In fact, there is little doubt that living specimens must have been brought to Europe, probably by the Dutch mariners, for the bird is represented in several old oil paintings; but in the present day these, with two heads, a foot (fig. 116), and a few bones, are the only records left to us of the existence of this curious bird. Nevertheless, from these meagre materials, the researches of modern comparative anatomists have shown that the true relations of the Dodo are with the Pigeons, as has already been stated (p. 284). The Dodo must have been as incapable of running with any degree of speed as of flying; it may be pronounced the most inelegant, awkward, and clumsy-looking creature of the whole feathered tribes. In size it exceeds the Turkey. The neck is thick and pursy; the body heavy, lumpish, and nearly cubical; the tail disproportioned, and not in the usual place. The plumage is represented as being a variegation of black and white, with a slight mixture of yellow; the immense mandibles open far back in the head behind the eyes; the upper one is black, except at the hook, where there is a red spot; the legs and feet are yellow, and the nails black; the toes are four in number, and one of them points backward. The Dodo was formerly found in the Isle of France; but for the last two centuries not a single individual of the race has been met with. The Dutch called it Walgh Vogel, or the disgusting bird, as well on account of its ugly figure as its offensive smell; the flesh, however, was found to be palatable and wholesome food, so much so in fact that the sailors visiting the Mauritius soon extirpated the race. Bones identical with those of the Dodo, with those of two nearly allied species, have been found in the little island of Rodriguez, and from the statements of some of the old voyagers it appears that these birds were living there when the island was discovered. (Fig. 117, the Dodo.)

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Ostrich.—The Common Ostrich is a native of the hottest parts of Africa, and exceeds all other birds in size, being often nearly eight feet in height, and six in length, from the top of the head to the base of the tail, when the neck is extended in a right line with the body. The head and neck are flesh-coloured, and nearly bare (fig. 118, head of the Ostrich), the tongue is small and short,

and the bill slightly flattened. The foot is furnished with two toes only; the exterior toe is much shorter than the inner one (fig. 119, foot). The wings and tail of both male and female are white; the body of the former is black, and that of the latter brown. The feathers are different from those of any other bird, being beautifully soft, and having the shafts situate exactly in the middle of the webs. Various statements have been given as to the habits of these birds. The ancient accounts of the Ostrich laying her egg on the sand, and leaving it to be hatched by the warmth of the sun, are now exploded, it having been satisfactorily shown that both male and female alternately incubate. It has been said that the Ostrich lays above fifty eggs, but this fact has been disputed; there is no doubt that even a greater number of eggs may have been found together; but it would appear, by the statements of some travellers of high reputation, that the male is frequently accompanied by several females, all of which lay in the same nest, and take their turns in the office of incubation, the male occasionally relieving them, by performing that duty himself. The male Ostrich is particularly attentive to the young birds; and he has been seen with two or three different broods at the same time under his protection; this circumstance has been accounted for by the supposition that he has met with and beaten off other male birds of the same species, and taken the broods of the vanquished into his own keeping. It appears equally probable, that the young birds of various sizes thus said to be seen with him, may be the produce of the eggs of his three or four mates, laid, perhaps, in separate nests, or it may be in the same, but at different periods. While the cock takes charge of the young birds which are first produced, the hens, or those at least which have laid late, may continue to incubate until the whole of the eggs are hatched. According to some authors, the provident mother-bird rolls two or three of her first-laid eggs to a little distance from the nest, and then breaks them; in a short time they are covered with flies and maggots, upon which the young Ostriches make their first meal. In the absence of good evidence as to the correctness of this statement, it will doubtless occur to the reader, that the eggs thus affording food to the newly hatched Ostriches may have been rolled out of the nest and broken by accident, at an early period of the incubation; or that they may perhaps have

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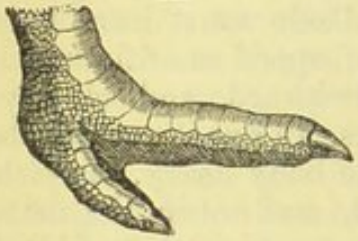

been addled, and cracked, subsequently to the departure of the brood from the nest; in the latter case they would offer a very early supply, though not the first meal of insects, to the young family. Voracious in the extreme, and endowed with strong digestive powers, the Ostrich greedily devours almost every substance which falls in its way; it is remarkably swift of foot; and though possessing great strength, is harmless and inoffensive, unless injured or provoked.

Cassowary.—The Cassowary is a native of the East India islands: it is between five and six feet in height, covered with remarkably long, narrow, black feathers, springing in pairs from one shaft or base; they are alike all over the body, and fall, in a singular manner, all over the sides, so that the small wing of the bird is not perceptible; in the front of the neck there are two wattles, resembling those of a cock, irregular on their surface, and of a mingled red and light blue colour; a hard and horny crest, or helmet, rises between the base of the upper mandible and the middle of the head (fig. 120); the toes, which are three in number, all pointing forward, are armed with strong black claws (fig. 121); the legs are remarkably strong, and the bird is capable of running with great speed. The Cassowary is exceedingly ravenous; and, it is said, does not seem to entertain a predilection for any particular sort of food, but, like the Ostrich, swallows almost anything edible. The eggs of this bird are of a grayish ash-colour, marked with green, and measure about fifteen inches in circumference one way, and nearly twelve the other.

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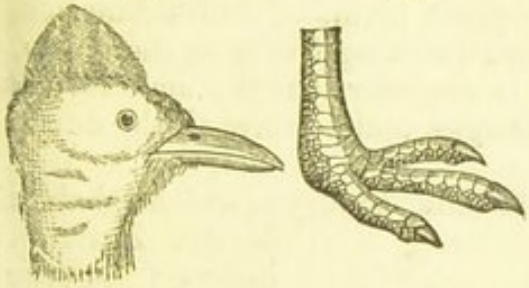

122

The Emu, or Cassowary of New South Wales, is thus characterized: it is blackish, the crown flat; its body bristly, its head and neck planted with quills, and its legs serrated behind. It differs materially from the other Cassowary, by wanting the horn on the crown of the head: the head and beak are also much more like those of the Ostrich; the tongue has a broad root, serrated sides; and pointed tip. This bird is exceedingly swift of foot, and strikes severely with its heel when pursued. It frequently

measures nearly seven feet when standing erect. In the neighbourhood of Botany Bay, the New-Holland Cassowary was formerly common, and often hunted by the colonists for the sake of its flesh, which is said to be similar in flavour to beef. The hen lays a number of eggs, which are rather less than those of the Ostrich; they are nearly of an oval shape, and of a bottle-green colour. The principal material of the nest is dried fern: it is usually constructed on the ground, on the borders of a swamp (fig. 122. Cassowary, or Emu, of New South Wales).

The American Ostrich, or Rhea, is not much more than half the size of the African species; like the Cassowary and Emu, it has three toes on each foot, and its head and neck are covered with feathers. It is abundant on the great plains of South America, and is described by Mr. Darwin, as swimming freely in the rivers. The Rhea is polygamous, and it is singular that the male bird is said to prepare the nest, collect the eggs, and perform all the duties of incubation.

Apteryx.—The curious bird called the Apteryx, which inhabits New Zealand, differs from the preceding species of this order in the form of its bill, which is long and slender, and bears the nostrils at the tip. Its legs are short, but very strong; and the feet have three large toes directed forwards, and a small hinder one. The Apteryx is a nocturnal bird, and feeds upon insects and worms. The New Zealanders call it *Kiwi-kiwi*, and prize its skin highly as an article of dress. A second species of Apteryx has been discovered in New Zealand within the last few years.

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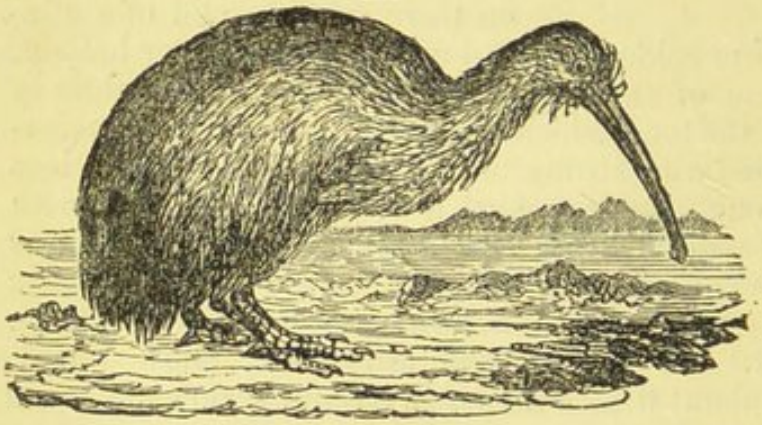
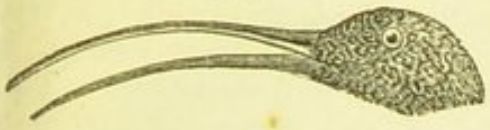


We must not quit the Struthious birds without mentioning the gigantic birds of this group, whose bones have been discovered in New Zealand. The largest of these birds, called *Dinornis*, by Professor Owen, is considered to have measured about fourteen feet in height. It seems probable that these immense birds, of whose former existence we are only made aware by their remains imbedded in sand, must have lived in New Zealand after those islands were peopled by human beings; the natives call them *Moa*, and, according to their traditions, their ancestors had to do battle with a race of gigantic birds.

WADERS.

The WADERS have, in general, remarkably long legs; hence their Linnæan name, GRALLÆ, which signifies a pair of stilts. Their toes are divided, or slightly connected by a membrane at the base, and they seem formed for living on the margins of lakes, the sea-shore, and among ponds and shallow waters, in marshes, and low countries. Most of them have very long bills, by which they are enabled to perforate the soft mud and weeds, in which they find a great part of their food (figs. 123 and 124, the beak and foot of the Curlew); while others have shorter legs and bills, and seem adapted only to prey on such insects, worms, &c., as are found near the surface (figs. 125 and 126, beak and foot of Moor-hen). The Cranes, Herons, Curlews, Snipes, Sand-pipers, and birds of similar formation and habits, are included in the order of WADERS, of which we shall describe some of the most remarkable genera.

123



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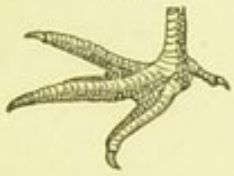

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126

Bustards (Otididæ).—The birds of this genus are the largest of the English land birds, the male Bustard usually weighing from twenty-five to thirty pounds. The characteristics of the Bustard are so singular, that it has been alternately placed among the GRALLÆ, ranked with the Ostrich, and made a genus of the order GALLINÆ. It frequents vast plains, has a long neck and legs, with feet formed for running. The toes, which are three in number, are all directed forwards. The upper mandible is slightly arched, and the bill rather pointed (figs. 127 and 128, foot and beak of Hen Bustard). The head and neck are of a pale ashy hue; the breast and belly white; the back, wings, and tail, are marked with dashes of deep brown and black, on a polished rust-coloured ground; a tuft of long feathers grows from each side of the lower mandible. The female is not above half the size of the male; her colours are

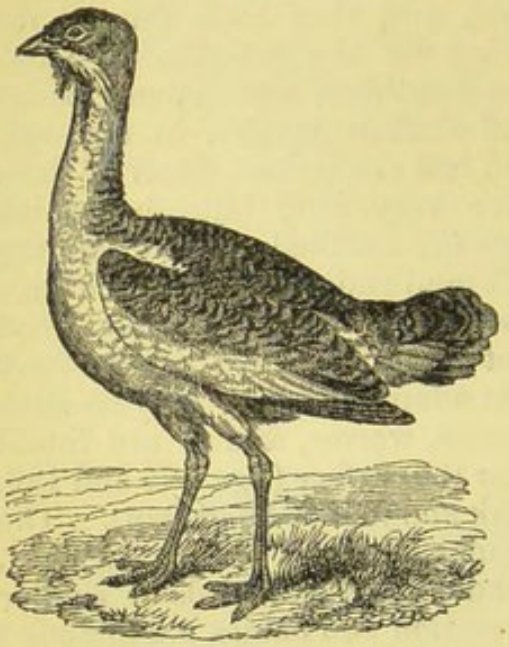
127

128

duller, and her head is of an orange ground, frequently striped with black. The female lays her eggs in a hole which she makes in the ground: they are usually two in number.

Bustards run with great swiftness, and cannot easily be induced to take wing; they feed on berries, herbs, and worms. Although once common on the extensive heaths and plains of this country, these birds are now nearly, if not quite, exterminated. The Turkey, and other Gallinaceous fowls, with which we have enriched our poultry-houses, are natives of other lands; all are inferior in size, and, as it is reported, none of them are superior in flavour to the Bustard; yet no attempt, that we can learn—and it is a fact much to be lamented,—has been made to domesticate this, which is an indigenous bird (fig. 129, male Bustard). Besides the Common Bustard of this country, there are other species found in different parts of Europe, Asia, and Africa. The Little Bustard, which is about the size of the Pheasant, has been occasionally met with in England.

129



Herons (Ardeidæ).—The birds of this family are very numerous: they comprise all the Storks, Herons, &c. Their food consists of fish, frogs, &c., and, occasionally, grain and herbage. They frequent lakes and fens, and usually, but with some exceptions, build their nests upon the ground. They have usually long, straight, slender, sharp-pointed bills (fig. 130, beak of Heron); legs of great length; feet of the common form, with the middle toe, in some species, pectinated, or toothed (fig. 131 foot of the Heron). The Common Heron measures about three feet in length; it rarely weighs more than as many pounds. The body of this bird is always thin, and its appearance miserable. Although rapacious in the extreme, it is cowardly in its disposition: it will fly from the

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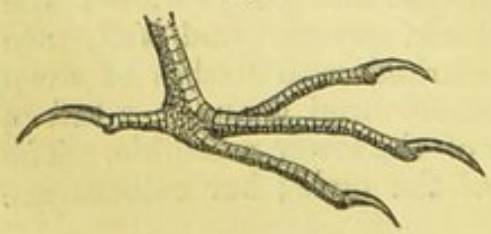


Sparrow-Hawk; and, in those days when falconry was one of the principal diversions of the great in this country, the Heron was ranked among the royal game; it was frequently served up to table, on extraordinary occasions; and a penalty of twenty shillings (an important fine in those times) was attached to the offence of destroying its eggs. For hours together the Heron will stand motionless in the water, watching its prey, and appearing more like the stump of a tree than a living creature. It will traverse immense distances in quest of waters in which its food abounds; and soars so high in its flights as scarcely to be visible to the naked eye. The plumage of the Heron is principally white, black, grey, and ashy. The male has a long, pendent, black crest, of which the female is destitute. The nests of these birds are often built on the tops of high trees: the hen lays four or five light bluish-green eggs (fig. 132, the Heron).

132

Bittern (Botaurus).—The Bittern is stouter than the Common Heron, but not quite so large as that bird: the greater part of its plumage is marked with a multitude of small streaks and specks of black, on a rust-coloured ground. The beak is very strong at the base, and tapers gradually to a very sharp point; the mandibles open behind the eyes; the top of the head is covered with a kind of crest of long feathers, which the bird can raise at will; the legs are of a palish green colour; the claws are long and sharp, and the middle one serrated. Bitterns, in the manner of taking their food, and in their general habits, very much resemble the Common Heron; but they are by no means deficient in courage. When attacked by a bird of prey the Bittern bravely defends itself, and frequently repulses its assailant; and if wounded, so as to be incapable of flying, it will not scruple to attack the sportsman, and often inflicts rather severe wounds with its keen and powerful bill. The

133

Bittern usually constructs its nest of rushes and withered water-plants, among the sedges which clothe the banks of pools. It is said that the hen feeds the young ones for three days in the nest, and then leads them forth in quest of food. The Bittern is remarkable for uttering, at certain times, a very peculiar, hoarse, hollow note, which may be heard at a great distance (fig. 133, the Bittern).

Boat-bill (Cancroma).—The form of the beak in birds of this genus is very peculiar; it is broad, depressed, and sharp at the point (fig 134). The Boat-bill is an inhabitant of South America: it is about the size of a Fowl; the tail and part of the back are of an ash colour; the breast, and all the under parts of the body, are white; and the residue of the plumage is black.

134

Stork (Ciconia).—The Common Stork is larger than the Heron: its plumage is white, except some parts of the wings and the scapulars, which are black. These birds are now rarely seen in Britain. In low countries, which abound with swamps and pools, as their food consists, for the most part, of reptiles, Storks are most welcome visitors: they usually resort to the neighbourhood of populous places, and their nests, which are considered sacred, are built on the tops of chimneys, steeples, or other high buildings; the hen lays from two to four eggs. Both the parent birds incubate, and are particularly attentive to the young. Storks are migratory; but they merely quit one temperate climate for another,—going northward in summer, and returning to the south in winter. Previously to their migrations, the Storks assemble in great numbers, and seem to hold consultations together; although they are remarkably quiet at other times, on these occasions they make a great noise, and a continued bustle is visible throughout the assembly.

Adjutant (Leptoptilus).—The largest bird of this genus is a native of the East Indies: it measures seven feet and a half from the top of the beak to the claws: it has a very large beak, and a drooping pouch of considerable dimensions. Latham states, that a young bird of an allied African species, about five feet in height, was brought up tame, and presented to the chief of the Bananas, where Mr. Smeathman lived, and being accustomed to be fed in the great hall, soon became familiar; duly attending that place at dinner-time, and placing itself behind its master's chair, frequently before any of the guests entered. The servants were obliged to watch it narrowly, and to defend the provisions with switches in their hands; but, notwithstanding this, it would frequently snatch off something or other; and was known once to have purloined a whole boiled fowl, which it swallowed in an instant. Its courage

is not equal to its voracity; for a child of eight or ten years old soon puts it to flight with a switch; though, at first, it seems to stand upon its defence, by threatening, with its enormous bill widely extended, and crying out with a loud hoarse voice, like a bear or a tiger. It is an enemy to small quadrupeds, as well as birds and reptiles, and destroys fowls and chickens, though it dare not attack a hen, with her young, openly: it preys also on rats, young kittens, and the like, and has been known to swallow a cat whole: a bone of a shin of beef being broken asunder serves it but for two morsels. The tame bird, above mentioned, used to fly about the island, and roost very high among the silk cotton trees; whence, at two or three miles distance, it could espy the dinner carrying across the yard; when, darting from its station, it would enter promiscuously with the women who carried in the dishes. While sitting, it was observed to rest itself on the whole of the hind part of the leg. It sometimes stood near, for half an hour after dinner, with the head turning alternately, as if listening to the conversation (fig. 135, the Adjutant, or Giant Crane).

135

Jabiru (Mycteria).—In this genus the bill is large, pointed, and turns slightly upward (fig. 136); the back of the head is bare; the legs are remarkably long, and the foot of the common form, having three toes forward and one behind. The habits of the birds of this genus are supposed to be nearly similar to those of the Herons, to which they bear a considerable resemblance.

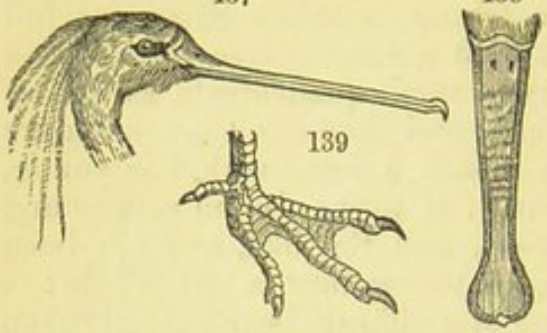
136

The Common Jabiru is a native of South America: it is a very large bird, with a bare black neck, encircled at the base with a broad zone of red; the tail, and the long feathers of the wing are black; the rest of the plumage is white. The beak of the Common Jabiru is black; in this respect the Senegal species differs from it; having the bill of a whitish colour, with a red base, and a broad black bar crossing it near the middle. The New Holland Jabiru, which is smaller than the former species, has the neck covered with feathers of a varying black and dark-green hue.

Spoonbill (Platalea).—The bill, in birds of this genus, is long, thin, and flattened (fig. 137); the end is dilated, so as to bear

some resemblance to a spoon (fig. 138, a front view of the bill); the tongue is small and pointed: the nostrils are placed near the base of the bill, and the toes connected, near their junction by webs, which lightly border them to their extremities (fig. 139.) These birds are found in various parts of the globe, but in small numbers only: they frequent the sea-shore, and such marshy places as are occasionally visited by flood tides; their food consists of small fish, water-insects, and worms, which their bills are admirably adapted for taking, in soft mud or slimy ponds.

137 138 139

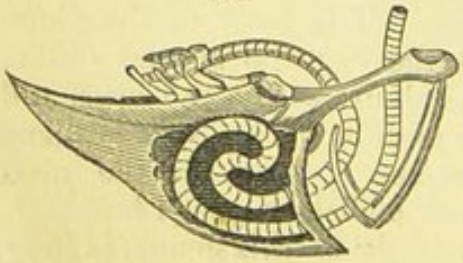


The Common Spoonbill (fig 140) is about two feet and a half in length; its plumage is generally described as being entirely white; but it has occasionally been seen with black tips to the quills. The nest of the Spoonbill is usually built at the top of a tall tree: the hen lays three or four eggs, which are white, speckled with red. To this country, the Spoonbills are only occasional visitants. In Holland, where they were once numerous, they are now become very rare. Bewick states, that they are to be met with in all the intermediate low countries, from the Feroe Islands to the Cape of Good Hope. In America there are two singular species of this genus, one of which scarcely exceeds a Sparrow in bulk; the other resembles, in size, the European Spoonbill, but its plumage is of a beautiful rose colour.

140

Cranes (Gruidæ).—The Crane is larger than the Stork, and differs as well from that bird as from the Heron, in the singular conformation of its windpipe, which, instead of following the same direction as in the generality of birds, enters into a cavity, adapted for its reception, in the breast-bone, before it passes into the lungs (fig. 141).

141



The plumage of the Common Crane is principally of an ash colour; a very elegant crest of feathers (which curl at the ends, and resemble the valuable plumes of the Ostrich, as well in texture as position), springs from the pinion, and falls over the tail. Among the various species of Cranes, the Crowned Crane, which is about the size of the Common Crane, is conspicuous: its head is ornamented with a fine crest, composed of a sort of feathers, each of which is barbed, or bristled, in a singular manner, throughout its whole extent. The plumage of this Crane (fig. 142) is of a dark greenish-gray. It is a native of Africa, and the Cape de Verd Islands. Cranes were formerly found in this country; but they have now almost entirely abandoned it. They are migratory, and in winter quit the northern parts of Europe and Asia for more southern and warmer countries. They are very easily tamed, and have been known to attain a great age in a domesticated state. A singular instance of the attachment of the Brown Crane to its companion, has been recorded by the late talented Mrs. Bowdich. One of a pair, which were kept by a gentleman in this country, having died, the other was, apparently, so affected by the loss of its fellow-prisoner, that but little hope was entertained of its surviving. At length, and as a forlorn hope, a large looking-glass was placed in the Aviary: the bird no sooner beheld the reflection of his own image, than,—probably conceiving it to be his companion,—he smoothed his ruffled plumes, assumed an air of joy, regained his strength, and lived some years after, perfectly contented, and passing much of his time before the glass. Bartram gives a singular account of the manner in which the Savannah Cranes make their nests. They collect a quantity of dry grass on a little hillock, which is nearly as high as their bodies; and in incubating, they stand with one leg on each side of the hillock, so that the breast only touches the eggs.

142

Plovers (Charadriidæ).—The Plovers have usually a rather short bill, soft, and rather slender towards the base, hard and arched at the apex. Their legs are long and slender, with small feet, and a very small hinder toe raised from the ground. The hinder toe is sometimes altogether deficient (figs. 143 and 144, beak and foot

of the Golden Plover. The Golden Plover is an abundant bird in England, and in most of the northern parts of Europe, migrating from one country to another, according to the seasons. It breeds on the mountains and moors, but in the autumn descends to the cultivated grounds, where it finds an abundant nourishment in the worms and larvæ of the ploughed fields. In the winter it removes to the coast. The Golden Plover, like the Lapwing, and other allied species, displays great cunning in drawing off the attention of passengers from its nest; these birds will run along the ground for a long distance, pretending to be wounded, and unable to fly, until the intruder has been lured to a sufficient distance from their abode, when they suddenly rise in the air, and return joyously to the care of their eggs or young.

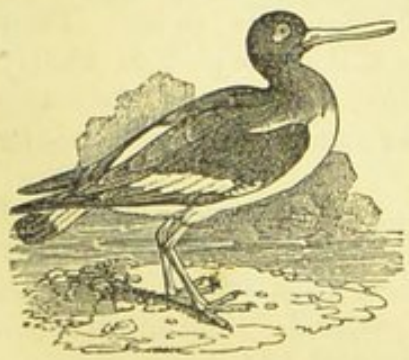
143 144

Oyster-Catcher (Hæmatopus).—The Oyster-catcher feeds principally on oysters; for opening the shells of which its bill is so exceedingly well adapted, that, as Derham remarks, it seems to have been framed purely for that use (figs. 145 and 146, beak and foot of the Oyster-catcher). The toes are only three in number; they are all placed forward, and united by a membrane as far as the first joint. The birds of this genus are scattered in small numbers over almost every part of the globe.

145 146

The Oyster-catcher usually weighs from fifteen to seventeen ounces: its plumage is black, dark brown, and white; the bill is about three inches long, of a bright scarlet colour, obtuse at the point, and compressed on the sides. Nature has not only endowed this bird with a beak that is admirally suited for its office,—namely, that of extracting oysters from their shells, and detaching limpets from the places where they grow, but its feet are also excellently protected, by a hard scaly skin, from the sharp points and edges of the shells and crags, across which it is compelled to walk in quest of its food. These birds occasionally take the water, but float rather than swim. The hen lays four or five eggs with black spots, on the bare ground, behind a little mound of sand, or a tuft of grass. It is said that she incubates during the night only,—leaving the eggs exposed to the warmth of the sun during the day (fig. 147, the Oyster-catcher).

147



Snipe (Scolopacidæ).—The bill in this family is long, flexible, and rather blunt at the point; the tongue is slender and pointed; the toes are divided to the origin, or have a very slight membranous connexion only: the hinder one is particularly small, or wanting (figs. 148 and 149, beak and foot of the Woodcock).

148 149

The Common Snipe generally weighs about four ounces; the plumage is diversified with various shades of brown; the bill is three inches long, and of a pale brown, or greenish yellow colour; the legs are of a faint green. The Snipe frequents low, moist places, in the mud of which it is almost constantly diving its bill, in quest of the small worms and insects on which it feeds. Snipes are migratory birds; but it is well known that they frequently remain throughout the year and breed in this country. Their nests are made on the ground, by the side of a clump of wood or a broken bank; the materials of which they are composed are nearly the same as those used by the Curlew for the same purpose. The hen lays four or five oblong eggs of a green colour, with rusty spots; the eggs, it is said, are all placed with their smaller ends in the middle of the nest. The Common Snipe is provincially termed the Heather-bleater, doubtless on account of the singular noise which it occasionally makes. Montague states, in his Ornithological Dictionary, that, in the breeding season, the Snipe changes his note entirely from that in the winter; the male will keep on the wing for nearly an hour together, mounting like a Lark, uttering a shrill piping noise; then descend with great velocity, making a bleating noise, not unlike an old goat; which is repeated alternately round the spot possessed by the female, especially while she is sitting in her nest.

The Woodcock (fig. 150) is about thrice the size of the Common Snipe, to which bird it bears a considerable resemblance in its plumage and habits. Although a migratory bird, the Woodcock, like the Snipe, frequently breeds in this country. The nest is made of the same materials as that of the Common Snipe, and it is usually built in similar situations to those chosen by the latter bird. The eggs are usually four or five in number, and marked with dusky spots on a rusty gray or ashy ground. The shape of the Woodcock's head is remarkable; the eyes are placed near the crown; the ears are in

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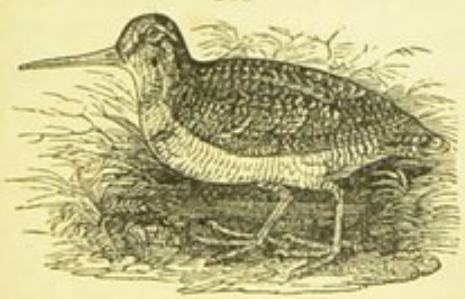
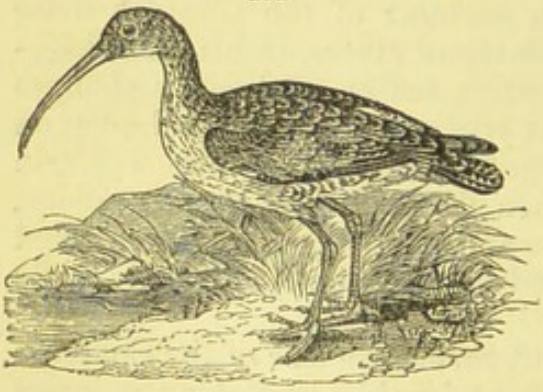


a line with the mouth, and lie very forward; the beak is about three inches in length; the end of the upper mandible projects over the lower, and terminates in a knob, which, being exceedingly susceptible, enables the bird to discover the small worms, on which it principally subsists, in the soft, marshy grounds, where, like the Snipe, it is generally digging and nibbling. Woodcocks arrive in this country, from the shores of the Baltic, singly or in pairs, about the latter end of October, and during the month of November; they depart again in April. They are supposed to land during the night only; and, after resting for a day near the sea, they proceed inland towards those haunts which they frequented during the preceding seasons. These birds are much sought after by the sportsman. Numbers of them are also taken by traps, springes, &c., towards which they are directed by means of little avenues placed in their usual paths; into these they enter without suspicion, as they will rather follow a path, however tortuous, than leap over any obstacles, when in quest of food. This singular habit renders them an easy prey to the noose or the net of the fowler; while their short, rapid, and irregular flight secures them, in many cases, from falling before the gun of the sportsman.

Curlew (Numenius).—The beak of the Curlew is long, curved gradually from base to point, and blunt at the end (see fig. 123, p. 299); the tongue is sharp-pointed and short; the legs are long, and a membrane connects the toes as far as the first joint (see fig. 124, p. 299).

151



The Curlew (fig. 151) is frequently seen in winter, on the English coasts, and on extensive marshy plains during the warm months. Its food consists of worms and insects, which it extracts with its long bill, from among moss and interwoven water-plants, &c., during its inland residence; while it remains on the seashore it subsists partly on fish. The hen lays four or five eggs of a greenish hue, spotted with brown; her nest is made on the ground, of dry rushes and other withered vegetable substances. Curlews differ much in size as well as plumage; they generally measure about two feet in length, and are of a brown colour, varied with darker markings on the back, wings, &c., and white on the lower parts of the body Some of the foreign species of this genus are very beautiful.

Ruff (Philomachus).—The upper parts of the plumage of the Ruff may be described as a mixture of dark-reddish ash and rusty

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brown, spotted and barred with black and white; the under parts are white. The length of the bird is about a foot; the bill is of a ruddy yellow near the base, and black at the tip; the front of the head is studded with tubercles; and a spreading ruff of feathers, beautifully variegated, and of different hues in different individuals, springs from the neck of the male. At two years of age the male birds acquire their ruffs, which disappear with the tubercles, after the moulting season, at the end of June, and are resumed again in the ensuing spring (fig. 152, the Ruff).

The females of these birds are called Reeves. They build their nests in dry tufts of grass or weeds, in fens, early in May; the eggs are usually four in number; they are white, marked with rusty spots. Ruffs are migratory, and arrive in this island, from more northern countries, in the spring; shortly after, they enter into terrible conflicts, and numbers of them are destroyed; at this time they are easily taken in nets, &c.

Stilt (Himantopus). — The Stilt, sometimes called the Long-legged Plover (fig. 153), is very rare in Great Britain. According to Latham, it is common in Egypt, being found there, in the marshes, in October; its food is said to consist principally of flies. It is also seen on the shores of the Caspian Sea, and in the East Indies. The upper parts of its plumage are of a deep black, and the breast, &c., of a pure white; its legs are red, weak, and of a most extravagant length; the base of the middle toe is connected to the outer one by a membrane. Mr. White says, that in a specimen of this bird, which he procured, the length of the legs was so extraordinary, that, at first sight, one might have supposed the shanks to have been fastened on, to impose on the credulity of the beholder.

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Phalarope (Phalaropus).—The body and legs of the Phalarope resemble those of the Snipe: the bill is straight and slender; the nostrils are minute; and scalloped membranes are attached to the toes (figs. 154 and 155, beak and foot of Phalarope). There are

154 155

several species of this genus. The Grey Phalarope is a very pretty bird, principally of a fine lead colour, pale brown, and white. It is an inhabitant of the northern parts of the world, and migrates southward in the winter: it is but rarely met with in the British isles. The edges of the membranes on the toes are finely serrated, as well as scalloped.

Avocet (Recurvirostra). — The bill, in birds of this genus, is of a very singular form; it is thin and depressed, and both mandibles are bent upwards; the legs are long, the feet are palmated, with deep indentions in the web, from the nails backward; the hinder toe is placed high on the leg (figs. 156 and 157). The Avocet (fig. 158) known in this country, weighs about thirteen ounces: its plumage is white, variegated with black patches, the form and situation of which vary in different individuals. The thighs and legs are of a pale blue colour; the bill is black, and between three and four inches long. In some parts of England, Avocets are common about the mouths of rivers in the winter; during the breeding season they retire to the fens. The female, when disturbed from her nest, is said to counterfeit lameness. She lays two eggs about the size of a pigeon's, of an ashy grey colour, marked with dark-brown irregular spots. The Avocet is a very lively and active bird; it feeds on worms, insects, &c. which it scoops out of the mud by means of its peculiarly-shaped bill.

156 157

158

Rails (Rallidæ).—The birds of the Rail family usually have the neck and legs rather short, but the toes are often of great length. The head is small, the beak rather short and compressed, and the body is also compressed from the sides.

The Common Rail is found in damp meadows and marshes, and along the borders of streams; its food consists principally of small animals, such as insects and worms, which it finds in abundance in such situations. It forms a large nest of dried grass and herbage. The Corn Crake is a migratory species, which inhabits our cornfields, where its cry of *crek, crek*, is a familiar sound.

Water Hen (Gallinula).—That well-known little aquatic bird, the Gallinule, or Water Hen, also belongs to this family. It lives on the sedgy banks of rivers and marshy pools, and swims and

dives with great ease, although its feet are not in the least webbed. Its food consists for the most part of insects and other small aquatic animals, but also in part of seeds.

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Coot (Fulica).—The Coots, which are very nearly related to the Water Hen, differ from that bird in having the toes furnished with broad scalloped membranes; the hinder toe has a plain membrane; the inner toe has two; the middle three; and the outer one four scallops (figs. 159 and 160, beak and foot of the Coot).

The Coot is about fifteen inches in length: there is a white spot under the eye; the remainder of the plumage is black on the upper parts, and greyish on the breast, &c. The thighs are placed far behind; they are bare and yellow above the knees; the legs are of a brownish green, and sometimes of rather a lead colour. The Coot swims and dives exceedingly well, but walks with considerable difficulty, and can seldom be induced to rise on the wing. It is frequently met with about the marshy parts of this country. The hen lays from ten to fifteen eggs, of a pale dull brown colour, with specks and blotches of a darker hue. The nest of the Coot is built in a tuft of rushes, upon the surface of the water; and should the winds drive it from its moorings, the mother-bird still broods over her eggs, or nestles her little ones, and endeavours, by means of her feet, to direct it into another harbour (fig. 161, the Coot).

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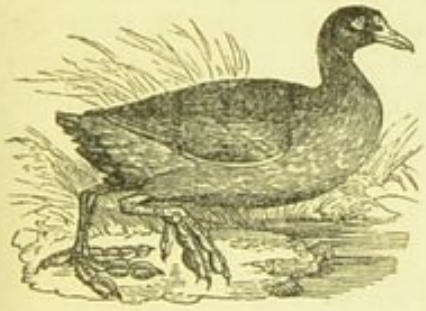

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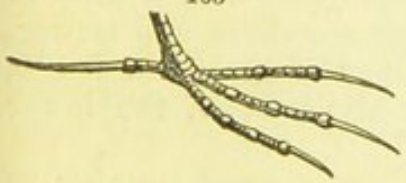

Jacana (Parra). — Of the foreign Rails the Jacana is distinguished by the immoderate length of the claws, which, in some species, are nearly half as long as the body, as well as by a sharp horny spine at the shoulder of each wing, and a scalloped cere without feathers, arising in front of the base of the bill, which is of a moderate length, and rather obtuse (figs. 162 and 163, the beak and foot of the Jacana).

The Chestnut Jacana (fig. 164) is about the size of a Lapwing; but its legs are much longer than those of that bird. The head,

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neck, and all the under parts of the body are black; the back, wings, and upper part of the tail, are chestnut; the greater coverts are green, with black tips; the spurs on the wings are of an orange colour; the legs and feet are bluish; the claws are remarkably long and sharp, particularly the hinder ones; the bill is yellow at the point, and red at the base; the cere, which is red, covers part of the forehead, but does not adhere to it. These birds are commonly seen in pairs; they frequent marshes, and are exceedingly shy. Nature, says Buffon, has armed the Jacana for war; yet we know not any foe which it combats. Man has, however, turned its powers to a good account. The most remarkable bird of the genus, the Faithful Jacana, is said to be easily tamed; and when domesticated is frequently made the guard of various kinds of poultry, which are committed to its care, as sheep to that of a dog. It is described as resolutely beating off birds of prey by means of the spurs on its shoulders, never deserting the charge committed to its care, but going out with them to proper situations by day, and very regularly bringing them all home safe at night.

WEB-FOOTED BIRDS.

The web-footed birds principally live in the water. Their nests are made on the ground, in holes, or among rushes; and in some cases upon the shelves or in the crannies of rocks, near the shore. Some of them lay only one egg each, and others from fifteen to twenty. Their food consists of fish, insects, worms, water-plants, &c. The bills of many of them are of singular forms; but in a great number the beak is broad, dilated, and furnished with a kind of nail at the tip. The legs are short and strong, and the feet widely webbed (figs. 165 and 166, beak and foot of the Mallard; *a*, the lower mandible.)

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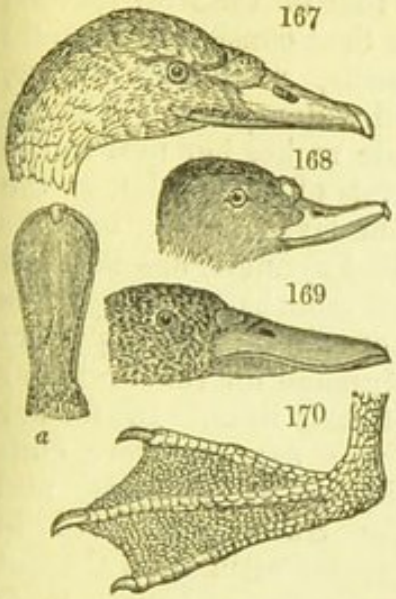
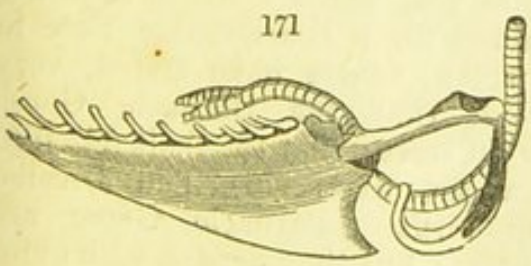
Ducks (Anatidæ).—This family comprises a great number of very beautiful species of birds; many of which are inhabitants, and several others, visitants of these islands. A few of them have been domesticated, and are exceedingly useful to man, on account

of the excellent flavour of their flesh; others, equally delicious, are sent to market in immense quantities, during the winter season, by fowlers, who catch them by means of snares, decoys, &c.



This family is distinguished by having a broad, flattish bill, with the tongue sharply fringed, the edges of the mandibles serrated, and the end of the bill frequently furnished with a nail; the feet are webbed, and the middle toe is the longest. (Figs. 167, 168, 169, the beaks of the Wild Swan, Sheldrake, and Shoveller Duck; fig. 170, foot of the Swan; and, *a*, flat view of the Sheldrake's upper mandible.) The Wild Swan is endowed with a fine form, to which it is enabled to impart the most graceful motion, and possesses plumage of the finest white imaginable. Wild Swans inhabit the northern parts of the world, but migrate southward when the weather threatens to become unusually severe. They are also said to assemble, in immense multitudes, on the lakes, at the setting in of the frosty season, and, by constant motion, and continually beating the water with their wings, prevent such parts as they prefer, or which abound with food, from freezing. The food of the Wild Swan consists of seeds and roots of plants, insects, and fish. The female builds a nest of water-weeds, and usually lays six or eight white eggs. Our reader has, doubtless, heard of the supposed musical voice of the dying Swan—an error which was so generally adopted by the ancients, that a Swan became symbolical of poetry. The truth is, that the Wild Swan emits only a harsh and unpleasing sound; and the voice of the Tame Swan is altogether destitute of power or sweetness.

The Tame Swan is larger, and of a stouter form than the wild species: it has a reddish, or orange-coloured beak, with a large black knob on the base of the upper mandible; the Wild Swan's beak is black, and its cere yellow. But the greatest distinction is in the internal organization: the windpipe of the Tame Swan is simple in its form (fig. 171); that of the Wild Swan enters into a cavity prepared for its reception in the breast bone, and is doubled therein, before it enters the



lungs (fig. 172); this, it is said, enables the bird to utter its singular, harsh, and powerful note. The plumage of the Tame Swan, in whiteness, is equal to that of the wild species. Its food consists of aquatic insects, mollusca, worms, and water-plants. The female makes her nest in the weeds of some islet, or the bank of the water on which she is kept: she lays from six to eight white eggs; and the young, which are called cygnets, are hatched in six weeks, or (as some writers say) two months. The cygnets are of a fine brown colour, and do not obtain their perfect plumage for the first year of their lives. In former times cygnets were considered as dainties, and the Swan was held in greater estimation than at present: although it is still a felony even to steal their eggs from the islands of an open river; and the Swans on the Thames are under the immediate guardianship of the Lord Mayor and Aldermen of London (fig. 173, the Tame Swan.)

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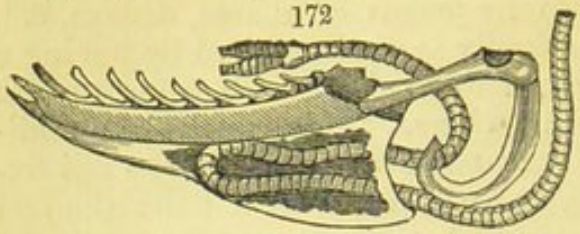

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Of the Geese we shall select, for description, only the Barnacle Goose, and the Guinea, or Swan Goose. Various fabulous accounts are given of the Barnacle Goose (fig. 174). Some authors have asserted, that the birds are produced from the Barnacles which grow on the bottoms of ships that have been long at sea, and on wood that has remained for a considerable time in the water; others have stated, very gravely, that the Barnacle Goose grew on trees; that the fruit fell into the water, when ripe, and became living birds. Barnacle Geese are found in this country in hard winters; but they depart, with numbers of other water-fowl, at the approach of spring, to breed in more northern latitudes.

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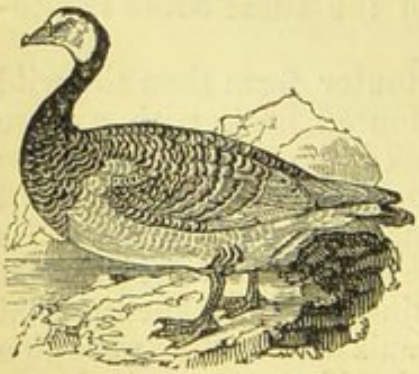

The Guinea, or Swan Goose, is remarkable for the proud and erect carriage of its body. It has a knob of considerable size on the base of its upper mandible, and, generally speaking, a loose bare pouch under its throat. It is supposed that the Swan Geese were originally brought from Guinea: they are now scattered over various parts of the world, and, kept, by the curious, with other domestic water-fowl, which they very much resemble in their habits. The plumage of the Swan Goose varies, like that of all other tame fowls; but the general colour of the feathers is brownish, with light edges of a fainter hue on the under parts than on the back and wings (fig. 175, the Swan Goose).

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The Tame Duck, which has been rendered so valuable to man hy domestication, owes its origin to the Mallard, or Wild Drake, to which, notwithstanding it has been so long under the dominion of man, the Tame Duck bears a great resemblance in figure and plumage. The Mallards arrive in this country early in the winter from the more northern climates, to which they return again in spring; but a few stragglers remain and breed among the fens and marshes of these islands; and the broods, thus produced, inhabit this country throughout the year. The wild species pair in the breeding season; but this is not the case with the domestic tribe. The female makes her nest among reeds, in marshy places, and generally lays about twelve or fourteen eggs of a pale greenish colour (fig. 176, the Mallard).

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The Teal is a very beautiful species of this family, and during the winter months, is common in many parts of England: it retires northward in the spring, but has occasionally been met with in this country, during the breeding season, surrounded by young ones. The nest of the Teal is usually concealed in a hole, beneath reeds and other water-plants; it is made of weeds, and lined with feathers. The female

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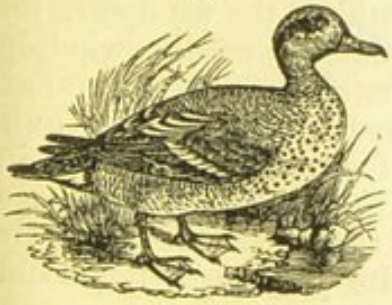

lays from six to twelve eggs, of a pale white colour, about the size of those of a Pigeon. Like the Mallards, and other birds of this family, the Teal feeds on worms, insects, small fish, seeds, and water plants. Its flesh is considered to be of excellent flavour (fig. 177, the Teal).

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An enlargement of the windpipe, is found among the birds of the Duck tribe (figs. 178 and 179, windpipes of the Mallard and Golden-eyed Duck). In the language of Willoughby, the windpipe of the Golden-eyed Duck hath a labyrinth at the divarications, and, besides, swells out above into a puff-like cavity.

Merganser (Mergus).—In this genus the bill is slender, roundish, and furnished with a crooked horny tip; the edges are strongly serrated; the nostrils are almost in the middle of the upper mandible: the feet are webbed; the legs are short, and the toes long; the three forward ones are nearly of an equal length (figs. 180 and 181, beak and foot of the Goosander). The Hooded Merganser, which frequents fresh waters, more especially mill-ponds, in Virginia and Carolina, is very remarkable for its fine tuft, or crown of white feathers, tipped with black, and covered at their base by other black feathers which spring from the top of the head, just above the eyes. The breast and lower parts of this bird are white; the neck and back, black; the quills of the tail and wings, brown; except the innermost in the wings, which are black, and marked with a white streak. The inner toes are slightly webbed on their outsides, and the back toes on their lower parts (fig. 182, the Hooded Merganser). The Goosander, which, like the other birds of this family, is an excellent diver, and remains for a considerable time under water, hath (says Willoughby) a huge bony labyrinth on the windpipe, just above the divarications; and the windpipe hath besides, two swellings-out, one above the other, each resembling a powder-puff; these, it is probable, contain a supply of air, which the bird inspires when diving, and is thus enabled to remain a much longer time beneath the surface of the water in pursuit of its prey, than it possibly

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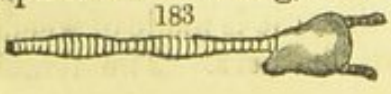

could if its windpipe were of the usual construction (fig. 183, windpipe of the Goosander).

Flamingo (Phœnicopterus).—This genus, which makes the nearest approach to the Wading Birds, and was formerly placed with them, is distinguished by a very broad beak, suddenly depressed about the middle, and serrated at the edges; the legs are long, and the feet webbed (figs. 184 and 185). Although the body of the Flamingo is scarcely equal in size to that of a Swan, the neck is nearly three feet, and the legs two feet eight to two feet ten inches, in length. These birds wade breast-deep in water, occasionally, but are not accounted swimmers. The Red Flamingo, when full grown, is of a fine rose colour, except at the tips of the wings, which are black. It frequents the sea-coasts of Africa and the south of Europe, and feeds on fish, water-insects, vegetables. The nest of the Flamingo is formed of mud, in the shape of a truncated cone, the top being hollowed so as to admit only the breast of the bird; it is usually built in a marshy pool, and raised a little above the surface of the water.

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Petrels (Procellaridæ).—This is a very interesting family of birds. The Petrels have been properly described as the adventurous inhabitants of the ocean; sporting in the tempest, and flying or swimming, with apparent delight, among the billows: they are met with in all latitudes, by mariners; but are scarcely ever seen on shore, except during the breeding season. The bill, in the birds of this genus, is hooked at the end, but straight towards the base; the legs are destitute of plumage above the knees; the nostrils are contained in one and sometimes two tubes; the foot is furnished with three toes, webbed, and all pointing forward, and with a spur behind (figs. 186 and 187, beak and foot of the Petrel). The Stormy Petrels are the birds which seamen term Mother Cary's Chickens. So great is their agility, that they seem to run along the surface of the sea, rather than to swim or fly: they are, probably, the smallest of all this order of birds, being scarcely more than six inches in length. They dive and fly, as well as swim, with great rapidity, and seem to possess the power of foreseeing a storm; long before any symptoms of its coming can be discerned by the most experienced seaman, they frequently approach, in numbers, towards a ship, and shelter themselves in its wake. The Fulmar, which is another bird of this family, is also stated by

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Pennant, to be a certain prognosticator of the change of wind; for if it come to land, no west wind is expected for some time, and the contrary if it keep at sea. The food of the Petrels consists of such gross and putrid substances as float in the water. Flocks of Fulmars will follow the track of a wounded whale, to prey on its carcase when the creature is no longer able to sink; and it is even said, that they occasionally perch on the backs of living whales, and peck out pieces of their flesh. From their gross mode of feeding, the Petrels are remarkably fat and rancid. When attacked, they possess the power of ejecting oil from their bills on their adversaries. The Fulmar supplies the inhabitants of St. Kilda, and some other places, with oil for their lamps; and the people of the Feroe and Orkney Islands are said to convert the little Stormy Petrel into a candle, by drawing a wick through its body. The Petrels lay their eggs in caverns and clefts of rocks, near the sea, and at a very early period entice their young to follow them over the waters. (Fig. 188, the Stormy Petrel.)

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Albatross (Diomedea).—In the same family with the diminutive Petrels, naturalists place the gigantic Albatross. The Albatross is a very large and fierce bird, principally found near capes and headlands in Africa and America; but its wanderings are occasionally so extensive, that it is seen in various parts of the world, and met with at greater distances from land than any other bird. The bill of the Albatross is large, hooked, and upwards of six inches in length; the toes are webbed and of a flesh colour (figs. 189 and 190, beak and foot of Albatross). The wings frequently measure, when stretched out, as much as fifteen feet; the plumage on the top of the head is of a brownish tint; the back is dusky, with brown spots, and the feathers on the under parts white. The Albatross is said to prey on small water-fowl, as well as fish.

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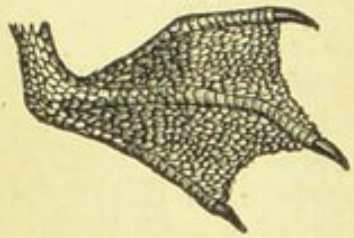

Gulls (Laridæ).—The birds of this family are widely dispersed, and, in many parts of the world, assemble on the sea-coast, and near the mouths of rivers, in prodigious numbers; they are very

voracious, and devour not only fish, but all sorts of putrid substances—slugs, snails, worms, &c., for which they often travel far inland. They are cowardly and cruel in disposition, and will attack and devour even any of their companions that happen to get wounded. The plumage of these birds varies materially, according to their age, so that some confusion exists among naturalists, as to the various species. Their bills are strong, straight, and rather hooked at the tip; the nostrils are oblong, and situated in the middle of the upper mandible. The three forward toes are webbed together; the hinder one is very small, and detached (figs. 191 and 192, beak and foot of Gull).

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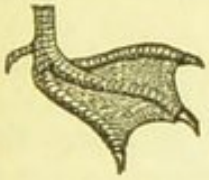

Tern (Sterna).—The beak, in birds of the Tern family, is straight and pointed; the nostrils are linear; the tail is forked; and the feet are furnished with scalloped webs. (Figs. 193 and 194, beak and foot of Tern.) The Terns, or Sea-Swallows, are remarkably nimble birds; they remain for a long time on the wing, catching numbers of insects which skim over the water, in their flight, and occasionally darting, with astonishing velocity, upon such small fish as they perceive swimming near its surface. They are seen in large flocks near the sea-shore, and at the mouths of great rivers, during the breeding season. Some of the species lay their eggs upon the bare rock, like the Great Auks and Razor-bills; others prefer holes in sand, or banks, and a few make their nests among the reeds and flags of marshy places.

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The Common Tern or Sea-Swallow (fig. 195) is frequently met with about the English coasts, and also on the banks of rivers near the sea, in this country. It measures fourteen inches in length; the bill is of a roseate colour; the legs and feet are also red; the top of the head is black; the plumage on the upper parts of the body is ashy, that of the breast, &c. is white. The eggs of the Common Tern—which, it is said, the bird only covers at night, or while it rains during the day—are spotted with black at the larger end, on a dusky olive ground. The nest is formed among

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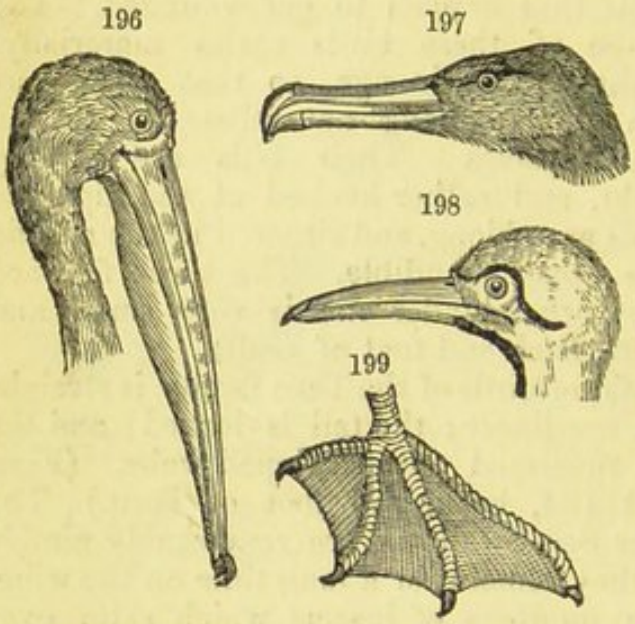
grass, reeds, or such other tall, coarse weeds as are found near the mouths of rivers, or on the banks of lakes.

Pelicans (Pelecanidæ).—In this family, which includes the Cormorant, Frigate Bird, Gannet, &c., as well as the Pelican, the bill is hooked or sloping (figs. 196, 197, and 198, beaks of the Pelican, Cormorant, and Gannet): the nostrils are often scarcely distinguishable; the face is usually bare, and beneath the lower mandible there is often a loose skin, capable of very great extension. In some of the species the legs are placed very far backward, so that the body appears nearly upright; the feet are broad, and the toes four in number; all of them are united by a web (fig. 199). The Pelican is larger than the Swan; its shape is awkward, its movements inelegant, and its bill immensely large. Its plumage is whitish, dashed with yellow on the neck, and black on the back. Beneath the lower mandible there is a pouch, which can be distended to a great extent (see fig. 196); this serves the bird as a receptacle for the fish which it takes while on the wing; and, on its return to shore, it dislodges the whole or a part of the contents, by pressing the pouch between its beak and breast, either to satisfy its own appetite or to feed its young. From this circumstance arose the fictitious story of the Pelican tearing its own breast to nourish its nestlings. This bird is found in various parts of the Old World, but it very rarely appears in this country. The Pelican usually builds in low, waste, marshy spots; its nest is formed of sedges, and lined with soft grass; the hen lays two or three white eggs.



The Cormorant is a well-known bird, occurring commonly in the northern parts of both hemispheres, where it wages a continual war with the finny inhabitants of the waters. It measures about three feet in length, and is of a blackish colour, more or less tinged with green; its bill is about the length of the head, and has no pouch beneath it, but the throat is capable of great distension. They frequent the vicinity of fresh waters, in which they dive with great facility in pursuit of their prey; their nests are usually built in trees. In China one of the species is commonly employed in

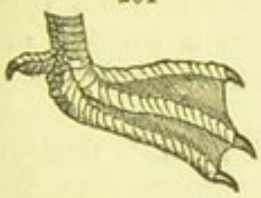
fishing; a leather thong or ring is put round the bird's neck to prevent its swallowing the fish; a number of them are taken out in boats, and on the word of command being given they disperse themselves over the water and begin to fish.

The Darters, Tropic Birds, and Frigate Birds, also belong to the Pelican family.

Divers (Colymbidæ).—Several species of this family frequent the shores of these islands. The bill is straight and sharp-pointed; the edges of each mandible bend inward: the upper is longer than the lower one; the tongue is serrated, and the nostrils linear: the legs are thin, and placed very much backward; the feet are webbed; the toes are four in number, the exterior one is longer than the others (figs. 200 and 201, beak and foot of the Diver). The Imber, or Immer Diver, is found in various parts of the world; it is nearly three feet in length; of a dusky brown or ash colour on the upper parts, and white on the breast, &c. It is a most expert diver, and (according to Buffon) swims under water to the distance of a hundred paces without ascending to take breath, a portion of air included in its dilated windpipe supplying its respiration during this interval. Latham states that it is sometimes taken, twenty yards under water, with a net, or an iron hook baited with fish. The latter author informs us, that the Imber makes its nest among reeds and flags, and, like the Grebe, places it on the water.

200

201



Grebe (Podiceps).—The Grebes, which also belong to the family Colymbidæ, are most expert swimmers and divers: "at sea, they seem to sport with the waves, through which they dart with the greatest ease; and in swimming, glide along, as it were, without any apparent effort, upon the surface, with wonderful velocity." The principal characteristics of the genus are, a long, straight, sharp-pointed bill; no tail; legs placed far back, thin, and doubly-serrated behind; and toes furnished with membranes (figs. 202 and 203, beak and foot of the Grebe). They are capable of rising from the water, but cannot take wing from land, except it be from an eminence; they walk with the body upright, and are liable to fall forward if urged beyond their usual slow place. They frequent inland waters during the summer months, and retire to the sea when the brooks and pools are frozen. They build their nests

202

203

either in holes of rocks, or among the reeds in marshy places, and lay two or three eggs.

The Eared Dabchick, or Eared Grebe (fig. 204), is about twelve inches in length, and weighs nearly twenty ounces. The upper parts of the plumage are black, the under white; and the sides rust-coloured; the tips of the mandibles are white; the base of the upper one red, and the remainder of both black: the head is covered with thick black plumage, except that large tufts of an orange colour rise behind the eyes, and, spreading out in a backward direction, nearly meet behind the head at their tops. The hen lays three or four white eggs; the nest is built of dry weeds, and placed among the flags and rushes on the borders of the water.

204

Auks (Alcidæ).—The bill, in birds of the Auk kind, is particularly strong, thick, compressed at the sides, and convex (figs. 205 and 207, beaks of the Razor-bill and Puffin): the nostrils are linear, and placed parallel to the edge of the bill; the toes are three in number, webbed, and all pointing forward (fig. 206, foot of Razor-bill). The Puffin, or Coulterneb, says Evans, is the most extraordinary bird that frequents the coast of Britain: its body is not larger than a Pigeon's, but its bill is of an uncommon size and shape; it is flat, with the edge upwards, and said to resemble the coulter of a plough; its legs are placed so far back that it moves awkwardly, and with great difficulty gets upon the wing. During the winter months these birds frequent the northern parts of Europe. About May they begin to arrive on our coasts; a few days after their arrival they prepare for breeding, by burrowing in the ground, in a winding direction, to the depth of eight or ten feet, and if they happen to get under a large stone, they consider themselves still more secure; in this fortified retreat the female lays one egg, relying upon its courage and strength of bill, with which it bites terribly, to ward off the attempts of its enemies.

205

206

207

The Great Auk, or Northern Penguin (fig. 208), is considerably larger than the Puffin; like that bird, the hen lays only one egg of an immense size, streaked and spotted with purple and rust colour; it does not burrow like the Puffin, but lays

upon a rocky ledge, as near as possible to the sea. The Razor-bill, also, lays her single large egg upon the bare rock, upon places which are so smooth, that it is wonderful the wind, or even the touch of the bird, does not roll it off: it has been said, that if it be moved by the human hand, it is almost impossible to replace it in its previous steady position. Hence, authors have been led to suppose that the egg, when first laid, is fixed to the rock by the glutinous limy substance which covers the shell, and hardens so as to keep it firmly in the place where it is first deposited, until the young one is hatched. Razor-bills migrate in immense numbers, during the breeding season, to various parts of the coast round the British islands; in some places thousands of them may be seen on rocks overhanging the sea, sitting on the ledges, in regular rows, and tier above tier, in the act of incubation; each bird knowing her own egg among the multitudes by which it is surrounded, and hatching it without molesting or being molested by her neighbours.

208

The Penguins of the Antarctic seas also belong to this family. Their wings are reduced to a more imperfect condition than even those of the Great Auk; and instead of being clothed with feathers, are simply covered with little scales. These birds are exceedingly active in the water, swimming and diving with great facility in pursuit of Fishes, and when under water they use their wings as fins. On shore they also employ them as a second pair of legs, but their movements under these circumstances are very awkward. They pass nearly their whole time upon the sea, rarely visiting the dry ground, except during the breeding season.

J.J.Jenkins. F.Heath.

THE TOILET.

THE TOILET.

Discourse we now of silks and cloth of gold;—
Of robes for birth-days and high festivals;—
The maiden's simple, unadorn'd attire,
And of the modest toilet of the bride.

OUR intention in the treatment of this delicate and important subject is by no means to attempt establishing a beau ideal of dress: because, it could be only applicable to some particular type of form and feature, which, after all, would be subject to as many differences of opinion as there are varieties of taste. Indeed, it appears to us, that there is not only a perfect style of costume, adapted to the various classes of figure and face, but for almost every individual. To enter into a description of these styles, would be to embark into a hopeless and endless task; for, to be complete, they must be as infinite and varied as nature herself. Our limits may be much more advantageously occupied by an inquiry into general principles, leaving their application, in most cases, to the reader's taste, which, however, we shall endeavour, in our progress, to correct or confirm.

Although the Toilet should never be suffered to engross so much of the attention as to interfere with the higher duties of life, yet, as a young lady's dress, however simple, is considered a criterion of her taste, it is, certainly, worthy of her attention, Her chief object, in this respect, should be, to acquire sufficient skill and good taste to do all that is needful, with regard to the attire, in the least possible period of time—to abbreviate the labours of the Toilet, so as not to intrench upon hours which should be devoted to the useful avocations of life, or the embellishments of the mind.

It will be a laudable ambition in her, to curb those excesses of "each revolving mode" with which she is in some measure obliged to comply; to aim at grace and delicacy rather than richness of dress; to sacrifice exuberance of ornament (which is never becoming to the young) whenever it is possible, to an admirable neatness, equally distant from the prim and the negligent; to learn the valuable art of imparting a charm to the most simple article of dress, by its proper adjustment to the person, and by its harmonious blending, or agreeably contrasting with the other portions of the attire. It is a truth, which should ever be borne in mind, that a higher order of taste is often displayed, and a better effect produced, by a paucity or total absence of ornament, than by the most profuse and splendid decorations. The youthful Isabella of Portugal looked better in that simple head-dress in which she is occasionally depicted (fig. 1), than in the nuptial robes which she wore on the day of her marriage with Philip the Good.

1

Isabella of Portugal, 1430.

Fashion demands a discreet, but not a servile observance: much judgment may be shown in the time, as well as the mode, chosen for complying with her caprices. It is injudicious to adopt every new style the moment it appears; for many novelties in dress prove unsuccessful—being abandoned even before the first faint impression they produce is worn off; and a lady can scarcely look much more absurd than in a departed fashion, which, even during its brief existence, never attained a moderate share of popularity.

The wearer must, therefore, at once relinquish the dress, or submit to the unpleasant result we have mentioned; so that, on the score of economy, as well as good taste, it is advisable not to be too eager in following the modes which whim or ingenuity create in such constant succession. On the other hand, it is unwise to linger so long as to suffer "Fashion's ever-varying flower" to bud, blossom, and nearly "waste its sweetness" before we gather and wear it: many persons are guilty of this error;

they cautiously abstain from a too early adoption of novelty, and fall into the opposite fault of becoming its proselytes at the eleventh hour; they actually disburse as much in dress as those who keep pace with the march of mode, and are always some months behind those who are about them; affording, in autumn, a post-obit reminiscence of the fashions which were popular in the preceding spring. Such persons labour under the further disadvantage of falling into each succeeding mode when time and circumstances have deformed and degraded it from its "high and palmy state;" they do not copy it in its original purity, but with all the deteriorating additions which are heaped upon it subsequently to its invention. However beautiful it may be, a fashion rarely exists in its pristine state of excellence long after it has become popular: its aberrations from the perfect are exaggerated at each remove; and if its form be in some measure preserved, it is displayed in unsuitable colours, or translated into inferior materials, until the original design becomes so vulgarized as to disgust.

There are many persons who, while they affect to despise Fashion, and are ostensibly the most bitter enemies of "the goddess with the rainbow zone," are always making secret compacts and compositions with her. Their constant aim is to achieve the effect of every new style of dress, without betraying the most distant imitation of it: they pilfer the ideas of the *modiste*, which they use (to adopt the happy expression of Sir Fretful) "as gipsies do stolen children—disfigure them to make them pass for their own."

Although the fickle goddess rarely approaches the realms of the truly beautiful, except immediately after having rioted in the regions of absurdity; and scarcely sojourns in the classic air of Greece for a moment, ere she wings her way to that which is barbarous; yet, in spite of her absurdities, she is not only obeyed, but admired in all ages and in all climes. By the force of habit, and by an unconscious association in the mind of a dress and its wearer, Fashion, even to those who are somewhat fastidious, generally appears graceful. To please her, the fine lady of one country almost feeds herself into an apoplexy; and the would-be beauty of another, starves herself into "the sister of a shade." The Chinese females cripple their feet; and the Europeans torture their waists into the narrowest possible compass. In one age she induces the fair sex to cover their faces with patches, and in the next, to avoid one even when required; alternately, to cashier, as it were, their natural tresses in favour of "false locks set on wires to make them stand at a distance from the head," as the honest old herald, Randle Holme, describes the fashions of

1670 (fig. 2); to elevate their hair to an immoderate height, as exhibited in the fine portraits of Sir Joshua Reynolds (fig. 6);

2 3 4

Coiffure of 1670. *The Tower.* 1700. *Ringlets.* 1777.

and to cultivate it into those ringlets drooping over the ears, so much admired in the seventeenth and again in the eighteenth century, and which have never gone entirely out of favour (fig. 4).

5 6 7

English Head-dresses after Sir Joshua Reynolds, drawn over Cushions.
1778. 1780. 1780.

General fashions should certainly be conformed to, when, as Goldsmith observes, they happen not to be repugnant to private beauty. They may often be so modified as to suit the persons of all; and occasionally be so managed as to seem to have been created expressly for the most advantageous display of many varieties of form or delicacy of complexion. But alterations in modes must be made with considerable judgment, otherwise

there is a risk of falling into absurdities: sometimes they are altogether intractable; it is impossible so to change a fashion, which has been especially invented for some tall and slender arbitress of taste, that it may retain all its original character, and look becoming on one whose form is either stout or petite. In this and similar cases the attempt should be abandoned, with the consoling idea, that the next mode will, in all probability, be decidedly advantageous to those who are, for the time being, debarred by nature from appearing at once graceful and fashionable, and the "Cynthias of the minute," in their turn, be thrown into the shade; for the authenticity of every new edict of Fashion is usually warranted by the fact of its being directly opposite, in letter and spirit, to its predecessor; thus, if one year she elevate the zone to its utmost possible height, she generally depresses it in an equally unreasonable degree the next: if she prescribe evergreens for the embellishment of the hair, in June, she commands "summer's glowing coronal," for the same purpose, in December. Should high flounces be patronized, short ladies must abstain from adopting them, because they are becoming only to the tall; and if narrow dresses obtain pre-eminence, the slender must not sacrifice that fulness in the attire, for which, to them, the most exquisite display of fashion can never be a sufficient compensation. The example of those who have long necks and low shoulders, should never lead those of a different style of person, to wear necklaces of great breadth, to raise the dress towards the ears, or, by quantity of drapery, or profusion of ornament, to produce an apparent union of the head-gear and the shoulders. Such a costume as that of Elizabeth of York, queen of Henry the Seventh (fig. 8), may add dignity to a certain order of forms, but it would certainly produce a contrary effect on the appearance of those who have neither long necks nor depressed shoulders.

8

Elizabeth of York, 1500.

Jewellery should never be used to cover any imperfections of form in the neck; it is in much better taste, for such a purpose, to wear a neat collar, reaching as high as the cheek (fig. 9, Mary Queen of England). Those who happen to be faultless in this respect, look better, perhaps, with the neck altogether unadorned (figs. 10 and 11, costumes of Mary de Berri, wife of John Duke of Bourbon, and of Anne Boleyn.)

9

Queen Mary.
1555.

10

Mary de Berri.
1540.

11

Anne Boleyn.
1534.

Whatever be the reigning mode, and however beautiful a fine head of hair may be generally esteemed, those who are short in stature, or small in features, should never indulge in a profuse display of their tresses, if they would, in the one case, avoid the appearance of dwarfishness and unnatural size of the head, and in the other of making the face seem less than it actually is, and thus causing what is merely petite to appear insignificant. If the hair be closely dressed by others, those who have round or broad faces should, nevertheless, continue to wear drooping clusters of curls; and although it be customary to part the hair in the centre, the division should be made on one side, if it grow low on the forehead and beautifully high on the temples; but if the hair be too distant from the eyebrows, it should be parted only in the middle, where it is generally lower than at the sides, whatever temptations Fashion may offer to the contrary. We might multiply instances *ad libitum;* but the foregoing cases will, we doubt not, satisfactorily elucidate our proposition. It is our object to impress on our readers the propriety of complying with the ordinances of Fashion, when their observance is not forbidden by individual peculiarities; and the necessity of fearlessly setting them at defiance, or offering only a partial obedience, when a compliance with them would be positively detrimental to personal grace: by these means they may escape the imputation of resembling those pictures in which the face is the work of a Raphael, but the draperies are thrown out by some empty pretender, destitute of taste, and entirely unacquainted with design. We do not think the jaunty hat of the days of

12

English, 1550.

Edward the Sixth will ever again become fashionable; still we think it may do for a *bal costumé.*

13

Elizabeth of Bohemia.
1630.

14

Lady Jane Grey.
1550.

15

Head-dress,
1688 and 1820.

To form the taste and improve the style of dress, a careful observation of classical figures and some of the costumes of bygone centuries will doubtless be found of considerable advantage. Let not the reader imagine that it is impossible to borrow hints for the attire from such sources without incurring a risk of appearing somewhat antiquated, for several of the most popular modes of the present century have been mere revivals of ancient costumes. Prince Rupert's mother appears to have dressed her hair very much in the same manner as a number of ladies did only a few years since (fig. 13); and the gentle Lady Jane Grey's attire (fig. 14) is very similar to what is sometimes adopted in our own time; but these are minor resemblances to what some of the costumes of past times afford. The female head-dress in 1688 (fig. 15), for instance, is remarkably similar to that which was in fashion within the last forty years among the ladies of this country. Holme states that the forehead was adorned with a knot of divers-coloured ribbons, the head with a ruffle quoif set in corners, and the like ribbons behind the head; and this mode does not appear to have been an invention of our author's day, but rather a revival of some mode of a still more remote period; for, in speaking of this and other devices of the like nature, he says, *all* are brought again from the old, for there is nothing new under the sun, and what is now hath been formerly.

We have still a much more singular coincidence of coiffure in reserve than any that have hitherto been noticed. However strange the statement may appear in words, it is true in fact, that the small bonnets worn by the ladies of England about thirty years ago, and which struck our neighbours, the French,

as being so excessively ridiculous, that they are still found in their caricatures of English women — those awkward, inelegant, little bonnets—are almost facsimiles of the helmet of Minerva, on Lord Montague's chrysolite (fig. 16).

16

Minerva Bonnet, 1828.

In attempting to engraft any part of the attire of olden times upon modern styles, as much discretion and judgment are required as in the modification of an ephemeral fashion to personal peculiarities; in the words of an Eastern sage, it is not enough that we go into the valley of flowers to gather a rose, even there we should not snatch, but select. In turning over the leaves of a portfolio of old prints, or a richly illuminated missal, a lady must not hastily adopt a head-dress because it is attractive and unexceptionable in the place it occupies; she should rather consider, in the first place, whether it will admit of being incorporated with the style of the day; and next, if it will become her own figure or features. The coiffure of Sappho, however classical it may be, would by no means suit a round and (if we may use the term) rural face; the Greek style of head-dress requires features of a Grecian form; and there are few faces that can afford to cover the finer portion of the forehead by natural curls or artificial ornament. (Fig. 17, head of Sappho; fig. 18, Greek head, from a gem; fig. 19, the Taure head-dress of 1674.)

17

Sappho.

18

Greek.

19

Taure Head-dress, 1674.

Although sharp features will never be improved by being surmounted with a cone-shaped cap; nor a short face, or one which expresses a meek and retiring disposition, by a regal coiffure, there are classes of features to which either of these styles would

be suitable (fig. 20, head of the Dauphiness Margaret of Scotland, 1400; fig. 22, Train-bearer to Isabella of Bavaria, Queen of Charles the Sixth of France).

20

Margaret of Scotland.
1400.

21

Isabella of Bavaria.
1420.

22

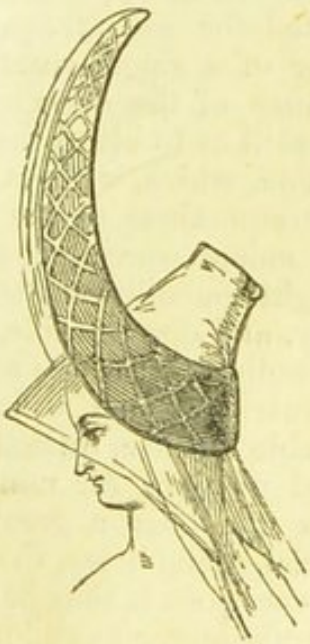
Her Trainbearer.
1420.

This lofty coiffure prevailed, more or less, for a very long period. Thus, in the reign of Edward the Fourth we have, among many others, the following curious forms.

23

English, 1465.

24



English, 1465.

But even those to whom such costumes would be very becoming must not venture to adopt them when low head-dresses are exclusively worn. They must then rather have recourse to the pictorial records of those eras when comparatively low coiffures were in vogue (figs. 25, 26, and 27, head-dresses in Luther's time).

25 26 27

Head-dresses from 1530—1540.

It is almost impossible to form a theory of the proper combination of colours applicable to dress; they are subject to a thousand contingencies, and we daily discover agreeable harmonies of tint where we least expected them, and excruciating discords produced by the juxtaposition of hues, which, from our previous experience, we were induced to imagine would prove pleasing rather than offensive. The influence of some neighbouring tint, the position of the colours combined, their relative stations, and the materials adopted for each, frequently tend to produce these effects. The colour of a single rosette often destroys the general tone and appearance of the dress, and occasionally it may be managed with such skill as to blend the tints of two or more principal parts of the costume, which, without some such mediator, would render each other obnoxious to the eye of taste. It is quite certain that the same colour which imparts a liveliness and brilliancy when used for light embellishments, and in a small quantity, becomes vulgar, showy, and disagreeable, if adopted for the most extensive portion and leading tint of the attire; and, on the other hand, the delicate or neutral colours, which look well when displayed over a considerable surface, dwindle into insignificance if used in small detached portions for minor ornaments. Generally speaking, trimmings will bear a greater richness of colours than the principal material of the dress, the breadth of which is apt entirely to subdue its decorations if they be not a little more powerful in tint. But it is a grave error to endow the minor parts of the costume with an undue superiority over the rest: it should never be forgotten that the trimming is intended to embellish the dress, rather than

that the dress should sink into a mere field for the display of the trimming; sufficient importance should always be given to the latter, so that it may enhance the beauty, add to the richness, or harmonise with the purity and neatness of the former; but if its colours be too strong, or, even when of the proper shade, if the material be too profuse, or not of a quality sufficiently delicate, it gives to the wearer either a frittered, gaudy, or coarse appearance; according to the nature of the fault. The same tint which looks well in a delicate material will not become an article which is made of "sterner stuff."

The occurrence of glaring offences against good taste in the trimmings or fixed embellishments of any principal part of the attire, is rare, compared with those which are perpetrated in the minor articles of gloves, shoes, ribbons, &c., which are the more important of the two, because they are not the trimmings or finishing decorations of a part, but to the whole of the costume. The former are usually left to the experience of the milliner, or copied from the production of some tasteful *modiste;* the latter depend solely on the judgment of the private individual. How often have we seen a dress, exquisite in all its parts, utterly ruined by the wearer, as a finishing touch, drawing on a vulgar glove! Much mischief of a similar nature is frequently done by feathers, flowers, ribbons, shoes, and articles of jewellery. It is not enough that a flower is pretty; it must harmonise with or form a pleasing contrast to the other parts of the costume, otherwise its use must be rigorously forbidden. It is the same with jewellery: pearls, for instance, will suit those kinds of dresses which rubies would spoil; and the latter are appropriate in cases where the former would look faint and ineffective. Shoes of flaming colours, we need scarcely say, are exceedingly vulgar; delicate pink, and faint blue silk, for these articles, have numerous advocates; but white satin, black satin or kid, and bronze kid, are neater and more elegant than any other colour or material. Gloves should be in the most delicate tints that can be procured: their colour has always an effect upon the general appearance; one kind of hue must not, therefore, be indiscriminately worn, or, however beautiful it may be in itself, obstinately persisted in, when every other part of the attire is constantly subject to change.

As it would be in bad taste for a fair young lady, who is rather short in stature, however pretty she may be, if irregular as well as petite in her features, to take for a model, in the arrangement of her hair, a cast from a Greek head; so also would it for one whose features are large to fritter away her hair—which ought to be kept, as much as possible, in masses of large curls, so as to subdue or, at least, harmonise with her features—into such thin and

meagre ringlets as we have seen trickling, "few and far between," down the white brow of a portrait done in the days of our first King Charles. Yet there is a class of features to which even these are becoming; of this we may be convinced by a glance at a collection of portraits of that period; unless, indeed, it be true that fine features, when ennobled by the inward light of intelligence, purity and goodness, look well in any fashion—that they govern and give character to the style in which they are dressed, and impart a charm to, rather than receive any benefit from, either modes or ornaments. Even if this be the case, there are but few heads which possess, in a sufficient degree, the power to defy the imputation of looking absurd or inelegant, if the hair be dressed in a style inconsistent with the character of the face, according to those canons of criticism which are founded upon the principles of a pure and correct taste, and established by the opinions of the most renowned painters and sculptors, in every highly civilised nation, for ages past.

28

Commode Head-dress.
1715.

29

A la Sevigné.
1680

In the arrangement of the hair according to the shape of the face and expression of the features; in the harmonising of the colours used in dress with the tint of the complexion; and in the adaptation of form, fashion, and even material, to the person, there is an ideal beauty, as well as in the figure itself, well understood, but very difficult to describe. Nature is so illimitable in her beautiful

combinations, that, although we may legislate for the few—the very few who are of any decided order of form, feature, or complexion—we cannot do so for the greater portion—the numberless individuals who, though by no means less attractive, may be said to belong to no class, but unite the peculiarities of many.

It is admitted that the brunette will look best in one colour and the blonde in another; that to the oval face a particular style of dressing the air is most becoming, and to the elongated a mode directly the reverse; that the short should not wear their dresses flounced so high as the tall: but in saying this we are speaking to a comparatively small number of persons. The decidedly dark, and those of a positively opposite complexion, are few; it is the same with the tall and the short—those with round faces and the contrary: in each case, the multitude is to be found "in the golden mean," between the two extremes. The persons composing the majority should neither adopt the specific uniform of the blonde or the brunette, the style of dress suitable to the lofty and commanding figure, or to that of the pretty and petite; but modify general principles to particular cases; not by producing an heterogenous mixture of a number of different styles, but by adopting a mode which borders upon that adapted to the class to which their persons approach the nearest, without entirely losing sight of, and in some degree being governed by, their own distinguishing and specific peculiarities; in fact, to be guided by that indispensable and ruling power in all matters connected with the Toilet—taste; which, as Demosthenes said of action in relation to eloquence, is the first, second, and third grand requisite, combining the triple qualities of propriety, neatness, and elegance. By its powerful aid the most simple materials are rendered valuable; without it, the richest robes, the most costly jewels, and "tresses like the morn," may be so employed as to encumber rather than to adorn.

AGE OF ST. LOUIS, 1260.

HORNED CAP.

NORMANDY.

HEAD-DRESSES OF THE AGE OF LOUIS XV.

COMMODE, *temp.* LOUIS XV.

NORMANDY.

FRENCH, 1280.

GERMAN.

GERMAN.

GERMAN.

GERMAN.

GERMAN, 1493.

SWISS.

SWISS.

SICILIAN.

ENGLISH, 1500.

ANNE BOLEYN, 1532.

ENGLISH, *temp.* CHARLES II.

SCOTCH, *temp.* CHARLES II.

VENETIAN, 1790.

FLORENTINE, 1790.

SPANISH, 1820.

SWISS, 1820.

SPANISH.
Elizabeth, daughter of Henry II.

RUSSIAN, 1800.

RUSSIAN, 1800.

RUSSIAN, 1800.

FRENCH, 1300.

FRENCH, 1450.

ISABELLA OF BAVARIA, WIFE OF CHARLES XI, 1420.

EMBROIDERY AND FANCY WORK.

Come hither, come hither, thou forester bold
Come hither, Sir Maurice, and see
Where four fair maidens, in cloth of gold,
Embrode thy victorie.

NUMEROUS as are the subjects treated on in this work, there are few which furnish a more pleasing occupation than Embroidery. To this art our readers are indebted for some of the most elegant articles of dress. It may also afford them opportunities of displaying their taste and ingenuity, and offers a graceful occupation and an inexhaustible source of laudable and innocent amusement.

The art of Needlework may be traced to the most distant periods of antiquity. Coloured Embroidery and Tapestry were, according to Pliny, known in very remote ages among the Jews and Babylonians. As a proof that this art was applied in the time of Homer to what may be termed historical subjects, Helen is described, in the third book of the Iliad, as occupied in embroidering the misfortunes of the Greeks and Trojans, of which she was the cause; and when the intelligence of Hector's death was brought to Andromache,

Far in the close recesses of the dome,
Pensive she plied the melancholy loom;
A growing work employed her secret views—
Spotted, diverse, with intermingled hues.

Penelope beguiled the tedious hours during Ulysses' absence at the siege of Troy with Embroidery; and we might adduce many other instances by which it would be clearly shown, that the art was held in equal estimation by the noble ladies of antiquity, as by those of our own country in the olden times, who, surrounded and assisted by their bower-wowen, employed themselves by representing, in the richest Tapestry-work, the heroic deeds which their living relatives or noble ancestors had achieved. Many splendid monuments of the genius and industry of the ladies of former days are still preserved, and constitute the hangings and other decorations of the state apartments of some of our old palaces and castles. Magnificent works of this nature were also performed in convents by the nuns and ladies of rank, who, from choice or otherwise, resided within their walls; the talents of the greatest masters in the art of painting being often employed to produce the designs. Raphael's celebrated cartoons were a series of Scripture pieces, executed as patterns to be worked in Tapestry.

The art at length rose into such high esteem, and Tapestry became so generally adopted for hangings of apartments, that the needle could no longer supply the immense demand for it, and looms were invented, in which it was woven on the most extensive scale. This improved method, which is supposed to have originated in Flanders, was introduced to this country in the reign of Henry the Eighth. James the First gave a large sum of money towards the erection of a manufactory for weaving Tapestry, at Mortlake, on the banks of the Thames, which flourished there for many years. The manufacture of Tapestry in France was introduced under the auspices of Henry the Fourth, and that kingdom may boast of having once possessed the most magnificent establishment of the kind that ever existed; we allude to the Hôtel Royal, des Gobelins, which a French dyer, of the name of Giles Gobelin early in the sixteenth century, erected for the purpose of carrying on his business, near a rivulet, which ran through the suburbs of St. Marcel, in Paris. In the water of this rivulet he discovered certain qualities, which he supposed would be beneficial in the prosecution of his improvement on the mode of dyeing red. His undertaking appeared to be so absurd, that the building was called Gobelin's Folly; but eventually he produced so splendid a scarlet, that he grew into high repute as a dyer, and he and his family continued to carry on the business in the same place until about the year 1667, when the building was purchased by the French government, and Tapestry on an immense scale was manufactured there for a considerable period. The establishment is still kept up, and though not on its former magnificent scale, is suffi-

ciently attractive to be one of the principal guide-book sights of Paris.

A slight sketch of the mode in which Tapestry was woven in this great manufactory may not be altogether uninteresting. Artists of eminence were employed to design and paint in water-colours, on stiff card or pasteboard, patterns, called cartons or cartoons, of the full size of the subjects intended to be woven. The carton was covered with perpendicular and horizontal black lines, its surface thus presenting a series of squares corresponding with those formed by the upright and cross threads of Tapestry. The workman counted the number of squares in each colour on the carton, as a guide to the number of stitches or threads to be inserted in worsteds or silks, of the respective colours, in the Tapestry; looms, both perpendicular and horizontal, were employed, similar in general principle to those in which carpets and hearth-rugs are woven at the present day. Threads, called the warp, were stitched the long way of the intended piece, and alternately elevated and depressed by machinery, for the purpose of introducing between them the silks or worsteds intended to form the pattern, and which were collected by the side of the workman, wound on reels, and inserted in the warp by means of a stick, called the flute, corresponding with a weaver's shuttle. The Tapestry being thus woven in breadths, when joined or fine-drawn together, formed one grand subject, frequently large enough to cover all the sides of a splendid apartment.

The manufacture of the loom-woven Tapestry originated in Embroidery with the needle, and presented a precisely similar appearance, being merely an extension of the art by means of machinery.

We shall close our introductory observations with a brief notice of the history of Lace-making, and a few remarks on the various kinds of Lace.

It has been supposed by some authors, that the art of making and working in Lace is of great antiquity; but no positive mention of it is made in any of the Greek or Roman authors; and the rich borders of the ancient vestments, which have been considered, from the descriptions given of them, as Lace, were more probably Embroidery of some curious and costly description. Lace was formerly made with the needle, in convents, and is still found attached to old furniture in some religious houses on the Continent. The honour of its invention has been confidently ascribed to Italy; but it appears tolerably clear, that the art of knitting Lace, which is much more modern than that of producing it with a needle, was first discovered in Saxony, about the year 1561, by a female of the name of Barbara Uttman. The art, by degrees,

found its way into Brussels, and was thence introduced into France, in 1666. A lady of the name of Du Mont and her daughters, obtained an exclusive privilege for its manufacture, and it soon became so fashionable, that in a short time the establishment afforded employment to above two hundred females.

The laces now most in use are *Brussels-point*, *Mechlin*, *Valenciennes*, *Lisle*, *Chantilly*, and *Blonde*. Most of these are made on a pillow or cushion, with bobbins, in the following manner: a small table or frame has a square hole in its centre, in which revolves horizontally a cylinder of wood, covered with several thicknesses of linen, and stuffed underneath with wool. On this pillow is fixed the pattern for working the intended Lace, viz., a piece of parchment, on which the flowers or sprigs are drawn in outline, and the apertures of the Lace are pricked in small holes. The pattern is so drawn, that when passed round the pillow and its ends joined, the design runs on in regular continuity. According to the pattern of the Lace and the number of threads, a quantity of small bobbins is used, on which fine threads are wound; they have small handles, by which the threads are twisted and otherwise interwoven in the working. The thread is confined on each bobbin by a small collar or clip of bone, having a slit down its side so as to open a little, and when pressed on, to retain the thread on the bobbin with a slight elastic pressure. It is not uncommon in many parts of England, and on the Continent, to see the female peasantry at the cottage-doors engaged in making Lace. They, however, use only a simple cushion, placed on the lap. The apparatus we have described is an improvement on that mode of working. The ends of the whole of the threads requisite are fastened in a knot, at the commencement, and the Net or Lace is formed by crossing them over each other, twisting two or three together, and otherwise combining them, in too intricate a manner to admit of a proper explanation here. The meshes of the Net are formed by brass pins, which are placed in a row on the pillow, according to the holes in the parchment-pattern; the threads are then passed or entwined round them by throwing the bobbins from one side to the other, and twisting the threads so as to form the meshes; succeeding rows of pins are stuck on the cushion, close to the places where the threads have previously crossed each other; other meshes are formed around them; the first pins are removed and stuck in the pillow again, and the process continues. The pillow revolves on its centre as the work proceeds along the pattern, and the Lace, as it is finished, passes over the pillow into a drawer beneath. The flowers or other ornamental subjects in the Lace, are interwoven at the same time that the Lace is made, by a minute crossing of the fine threads of

which the Net is composed, together with an intermixture of stronger threads, principally for outlines; the whole of the flowers or subjects are formed by placing the pins in their proper positions, as guides for the interweaving of the threads.

In some kinds of Lace, the more solid parts of leaves or flowers are formed by the introduction of the finest cambric interwoven with the Net, or inserted afterward with the needle.

Brussels Point Lace has always been deemed the most valuable, and is the only sort used in court-dresses, for gentlemen's frills and ruffles, and the principal one for the trimmings of ladies' dresses. The most beautiful and expensive veils are also of this manufacture. It may be distinguished by the appearance of some parts of its ornamental leaves, which resemble French cambric; and by a thick and bold prominent thread round their margin, which appears worked over in button-hole stitch with another very fine thread; it has also a peculiar yellow hue, which tint is studiously preserved by rinsing the Lace, after having been washed, in a weak solution of coffee.

Mechlin Lace ranks next in estimation for delicacy, firmness, and accuracy in the Net; and the flowers which are woven in the working, have generally a thicker thread worked in at the same time, and forming their outline.

Valenciennes Lace is noted for its strength and durability. Its ornamental sprigs and flowers are woven like those before described; but they have not, usually, any outline of thicker thread.

The Lace of *Lisle* is strong and useful, but not very fine, and is held in less estimation than those previously mentioned.

By *Chantilly* is generally understood a Lace frrmed of the finest black twisted silk. The veils of this kind are much admired. The thicker parts of the flowers seem composed of several thicknesses of silk, having the appearance of being darned in afterward. The lighter parts are formed in the making of the Lace.

Blonde Lace is of silk, both black and white, and has a more shining appearance than the Chantilly, arising from the texture of the silk, which is not so hardly twisted. It is usually employed for the trimmings of dresses. The flowers and leaves are in general distinguished by one of their sides being worked very thickly, and the other formed by open work.

There are many other kinds of Lace, named after various continental towns; but those we have described are in the highest reputation. We hardly know why the distinct qualities in the Laces we have enumerated should appertain especially to the particular places whose names they bear; but it is well known, that the Laces bearing the names of certain places have peculiar

qualities and appearances, whether they are made at those towns or not.

There are various British imitations of the foreign Laces; among which the productions of *Nottingham* are the most distinguished. There is also a kind called *Honiton* Lace, in which the flowers or sprigs are made separately, and sewed on afterward. The Honiton sprigs and trimmings may be purchased alone, for the ladies to embroider or net, and to their own taste.

Among the English Laces, *Urling's Lace-Net* has, latterly, obtained the greatest celebrity for the beauty of its patterns and its cheapness. It is made by means of machinery, and the Net is cleared from all its loose fibrous parts by being passed over the flame of gas. It is applied to all the purposes of other Laces, as well as to veils and dresses.

Lace-making, though formerly practised by ladies, having now become so important a branch of European manufacture as to furnish employment for many thousands of females, to give proper practical instructions would be useless; we have, therefore, only aimed at conveying such information as would afford our young friends a general idea of the process.

Quitting the historical for the practical part of our subject, we now proceed to notice modern Embroidery, and to describe, in succession, those branches of the art which we consider most worthy of attention.

COLOURED EMBROIDERY.

Pictorial or Coloured Embroidery is similar, in some respects, to the ancient Tapestry, although it is generally worked on a smaller scale, and is rather different in practice. It comprehends the admired productions of the needle in coloured Embroidery, with worsteds and silks of various hues, and is applied to the imitation of paintings; comprising all the varieties of landscape, groups of animals, historical subjects, fruits, flowers, birds, shells, &c. Its effect is very brilliant if it be well executed, and judgment and taste be displayed in the selection of the various shades of colour; it is, in fact, "the soul and sentiment of the art."

The fine-twisted worsted, called crewel, and both twisted and flos silks are employed in coloured Embroidery. Silk is principally used for flowers, birds, and butterflies, and is worked on a silk or satin ground. The latter is by far the richest in appearance; and nothing in this art can have a more splendid effect than a well-arranged group of flowers, embroidered in twisted silks on black satin. A talent for painting is of material advantage in this

delightful pursuit, the variety and delicacy of the tints giving ample scope to the genius of the embroideress.

The subjects worked in crewels consist of animals, landscapes, and figures, on fine white holland for large designs, and on white silk or satin for small ones. Silks are rarely used in the same pieces with worsteds, except for the purpose of representing water, which should be worked in flos silk of pale grayish shades. The holland or silk on which the subject is to be worked, must be first strained tightly over a wooden frame, and secured with small tacks at the back. The design is then to be sketched in pencil, and coloured in water-colours, rubbed up with gum-water, as a guide to the colours and shades to be selected in the progress of the work. It is, however, proper to observe, that frames strained for use, and with subjects drawn and coloured on the holland or silk, may be purchased at many of the fancy shops.

The features of the face, the hair, and all flesh parts, on a silk or satin ground, are usually finished in colours by the artist, and left untouched in the Embroidery.

One kind of stitch only is used in this work; it resembles the thread of satin. Having tied a knot at its end, the worsted is first brought from the under-side of the cloth to its surface; then (in working a sky, earth, grass or water, drapery, or any other plain subject) the needle is passed back again, from the upper side, at about half an inch distance, more or less, in proportion to the size of the subject. It is again brought up, at about half way distance from the first point, the stitch reaching about as far beyond the second. The stitches are taken the long way of the figure or subject, ranging in parallel lines, and of unequal lengths, in order more completely to cover the ground (fig. 1). In drapery, the stitches should be taken in the same direction as the threads or grain would naturally fall. Leaves of trees are worked, for distant effect, in short stitches, crossing each other in various directions. The rough coats of some animals, as the sheep, &c., may be worked in lamb's-wool, of the proper shades.

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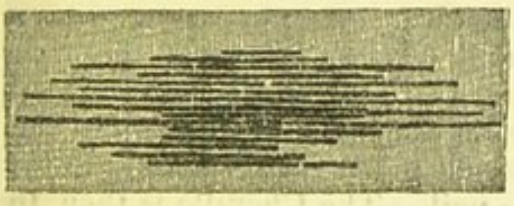


To say anything of the colours to be selected would be useless; it is only necessary to follow, as closely as possible, the colouring and shading of the artist in the ground sketch, and good taste will avail more than a volume of instructions. An attentive and minute inspection of good specimens will be of the utmost service. The most perfect artist in this department was the late Miss Linwood, at whose exhibition of needle-work, in Leicester-square,

some of the finest paintings of the great English and Italian masters were imitated in a style of almost incredible excellence, The flesh parts, and even the features of the face, were worked entirely with the needle, and with such talent and delicacy, that, at a very short distance, they could not be distinguished from the finest productions of the pencil. One of these pictures was so highly appreciated, that a thousand pounds, it is said, was refused for it.

CHENILLE.

Embroidery in Chenille is usually done on White Gros de Naples, or white lutestring, for producing representations of groups of flowers in their natural colours, principally from pictures. Chenille is a fine silk poil or nap, twisted spirally round a thread, for purposes such as we are now describing, and round a fine wire when used in making artificial flowers, and has derived its name from its slightly caterpillar-like appearance. The silk on which it is to be worked must be strained in the middle of a frame, similar to that used in Worsted-work. A coloured copy is requisite, from which a light outline sketch should be made in pencil on the silk. Chenille of all the requisite shades having been provided, it is attached to the silk, not by passing through, after the manner of Worsted Embroidery, but by sewing or tacking down, as the nap would be much injured by being drawn through the silk. A fine needle, and silk of the same shade as the Chenille to be attached, having been provided, the stalk of the flower is to be commenced by confining to the silk ground the end of the Chenille, with a small stitch of similarly-coloured silk, and which will be concealed in the poil. The Chenille is then to be carried along the stalk, according to the sketch, tacking it in a similar way at intervals; the stalk may be of one, two, or three rows, according to the thickness required. A leaf, if large, is formed by passing the Chenille from the centre vein towards one edge, in a bias direction, backward and forward, laying the rows closely together, and confining them at the turnings and at the centre; the other side is done in a similar manner. For a small leaf or bud, the Chenille may be passed across the whole breadth of it, and may be turned over itself where necessary. The flowers are to be formed of Chenille in the tints of the coloured pattern, and attached in the various directions which may seem most accordant to their shape. When it is desired to quit any colour, the end of the Chenille is secured by passing a fine silk loop over it, threaded in a needle, and drawing the end of the Chenille through the silk with the loop; it is then cut off, and the

poil will prevent its slipping back. To produce the effect of shading, or blending one tint into another, the Chenille must be set wide, the ends must terminate by being drawn through, as before described, instead of turning again, and the next colour is to be introduced between.

TAMBOUR WORK.

Another kind of Embroidery is executed at the tambour, which is a frame resembling a hoop, over which the material is placed; another hoop, made to fit, is passed over it, both hoops being covered with woollen cloth, and the work is strained tight between them. The hoop is then placed in an horizontal position, between two upright supports fixed in a stand, and when in use, placed on a table. For large subjects a square frame is used, the four sides of which separate, and which, having a number of holes near their ends, are united by moveable pegs, according to the size required. This frame rests on a stand, at a convenient height from the ground. The tambour-needle is a small steel instrument fixed in an ivory handle, and has a small notch near its point, which answers the purpose of a hook; and in working, the right hand, which directs the tambour-needle, will always be on the upper side of the work; and the left hand, which supplies the worsted or cotton, on the lower side. The principal materials on which Tambour-work is employed, are muslin and net, and the Embroidery is generally done in coloured crewels, white twisted cotton, or gold thread. The design is previously drawn on the material or ground with indigo, which will afterward wash out. If it be intended to work in crewels, a coloured pattern will also be of service, as a guide to the selection of the worsteds, which are usually worked into very beautiful groups or wreaths of flowers, in their natural colours, principally for the bottoms of dresses.

In working, the needle is passed through the muslin, from the upper side; the worsted or cotton, being held underneath, is placed on the hook and drawn through, so as to form a loop on the surface. The needle is then passed through that loop, and also through the muslin, at a few threads' distance; a second loop is then drawn up through the first; a third loop through the second; and thus the work is continued. In a narrow or pointed leaf, it is usual to work its complete outline first, passing up one side and down the other, and filling up the middle with succeeding rows. In a round or oval leaf, the stitches should begin at the outsides, and form one row within another, terminating in the centre. Stalks are worked in single or double rows, as the thickness in the pattern may require. Small sprigs are sometimes

thus embroidered in gold thread on India muslin, for ladies' head dresses.

PRINT-WORK.

Print-work, so called from its resemblance to dotted and line engraving, is principally applicable to small subjects, on account of the minuteness of the stitches employed. The design is sketched in pencil, on white silk, or satin, previously stitched on a frame as before described. It is worked with a very fine needle, in black silk, or in silk of different shades, from a jet black, through all the gradations of a lead hue, to the palest slate-colour.

Imitations of dotted engravings are worked in small stitches (similar to the first stitch in marking), set exceedingly thick; beginning with the darkest parts in black silk, and gradually working towards the lighter parts with silks of appropriate hues; blending them into each other, by setting the dark stitches wider apart, where it is requisite to change the shade, and working those of the next tint into the intervals thus left. It is necessary to place the engraving constantly in view, as a guide for the lights and shades.

Subjects in imitation of line engraving are worked for rather more distant effect than those we have just described. The same fine silks are used, but the stitches must be longer, and set rather apart from each other, according to the lines in the original.

WORSTED-WORK.

Worsted-work, on canvas, is a subordinate description of Embroidery. It is applied to the production of rugs for urns, covers of ottomans, bell-pulls, and many other elegant articles. The outline of the pattern is sketched, with a pen, on canvas, strained in the middle of a frame.

In working a rug, it is usual to commence with the centre, which is done in tent-stitch, or as the first stitch in marking. The worsted is brought from underneath, and passed down again in an angular direction, over the next cross-thread of the canvas. It is to be particularly observed, that all the stitches must go in one direction; the colours of the worsted should be selected to imitate the various tints, as in a painting of the same subject. The whole of the ground is to be filled up in the same sort of stitch as that

adopted for the centre, with white glazed cotton, worsted, or silk. When the work is removed from the frame, it is advisable to tack a piece of paper over the centre, in order to keep it clean, during the working of the border, which is formed by long loops, in a cross-stitch, on the canvas, taken over a flat ivory mesh-stick. The border is usually done in a scroll pattern, shaded tufts, or shades of colours in lines. When finished, each loop is cut with a pair of scissors; the rug is then laid flat on a table, and the surface cropped smooth. It should be beaten with a little cane to clear out all the small loose fibres of worsted; and may be lined, at the back, with glazed cambric, or baize.

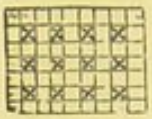
Ottomans, or foot-stools, are worked all over exactly in the same manner as the centre of a rug.

Bell-pulls are also worked with the same worsteds, and in the same stitch as rugs; usually in a running-pattern of flowers, on a strip of canvas of a proper length, which may be bought, with a selvage on each side, adapted to this peculiar purpose. The ground is generally filled up with a colour that harmonizes with the curtains or other decorations of the room for which the bell-pulls are intended. The edge is either finished by a binding of velvet, or worked in a sloping direction, so as to cover about three threads of the margin of the canvas, and forming a satin-stitch. The top of the bell-ribbon is finished with a tuft, worked on a round piece of canvas, in the same manner as the border of a rug; it is afterwards tacked on a circular piece of pasteboard.

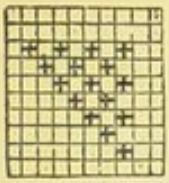
Paper patterns, covered with black cross lines to represent the threads of canvas, and painted on the squares in the proper colours, may be bought at the worsted-shops; but in working from these patterns it is necessary to use the cross-stitch, which is taken in an angular direction over two threads of the canvas, and then crossed in the same way. The pattern is not to be tacked to the canvas, but merely placed in view as a copy. The centre of the middle flower, or ornament, is to be first ascertained, and the coloured squares in the pattern counted from it, as a guide for the number of stitches to be taken in each colour on the canvas.

EXPLANATION OF STITCHES.

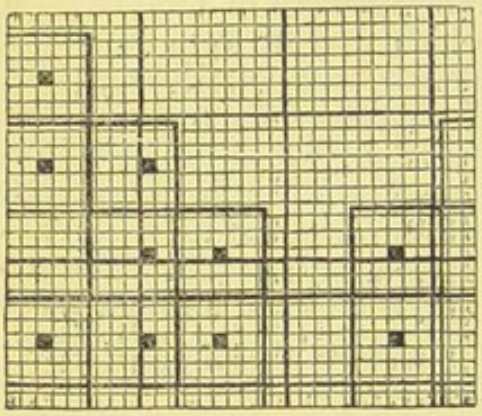
1. *Tent Stitch.*—This is worked by passing the wool over one thread the cross way, and should be done in a frame. In grounding, perform the work the bias way of the canvas, and work from left to right.



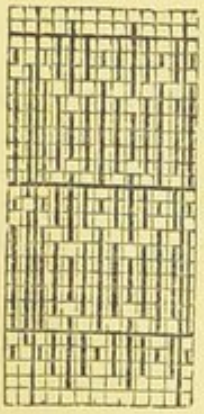
2. *Cross Stitch.*—Let the wool be put across two threads in a slanting direction, from right to left; bring the needle up again two threads below where it was inserted in a straight line, then cross it over two threads in a slanting direction, from left to right; this completes the stitch.



3. *Straight Cross Stitch.*—This stitch is the same as Cross Stitch, but is worked the straight way of the canvas; and although on coarse canvas, has a very pleasing and finished appearance.

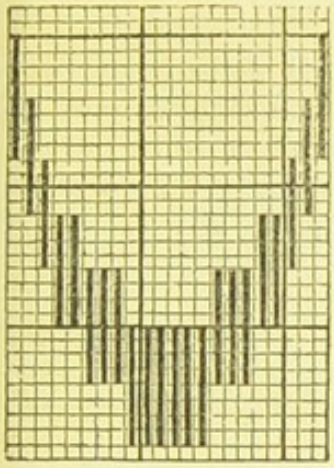


4. *Windsor Stitch.*—Pass the wool over six threads straight, and six threads down, which will present a square when the second row is completed. The pattern *A-la-Vandyck* may be rendered very beautiful by a judicious choice of colours, and of gold and steel beads, forming central points in particular shades. In making bags, a tasteful border should be added.

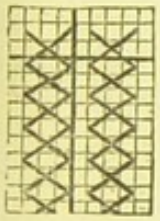


5. *Pavilion Stitch.*—Four threads having been taken straight down, bring the needle down one thread; after that take two threads, then four, as before, and finish the row. Commence the second row with a stitch in two threads, then take four, and so proceed. Gold beads tastefully introduced have a very pretty effect.

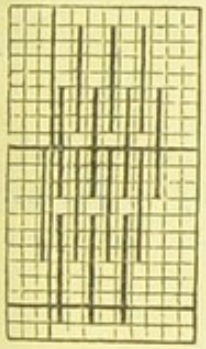
6. *Josephine Stitch.*—This is a very pretty stitch for bags with gold or silver braid, and is executed in stripes from the bottom to the top. Take six threads straight, and proceed to the end of the row; after which, take three lengths of braid, and work one of them in Cross Stitch, diamond style.



7. *Berlin Stitch.*—Work this stitch in a scollop, taking six threads straight down. Much of the beauty of it depends upon the contrast of colour (having an eye to harmony) in the threads. The effect should be ascertained before beginning to work.



8. *Czar Stitch.*—We have heard this called *Economic* Stitch. It is worked over from six or eight threads in depth and two in width, crossed from right to left. Gold thread should be interposed between each row.

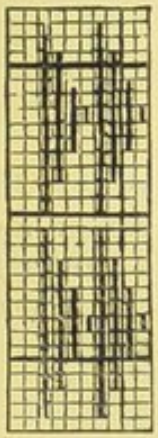


9. *Irish Stitch.*—Four, six, or eight threads are to be taken straight, two threads being left between. The second row is to be begun four threads up, between the two threads left on the former row ; and in working the third row, take care that the stitches meet the first row. This is a valuable stitch, easily worked into a variety of pretty forms.

10. *Willow Stitch.*—This is sometimes called Basket Stitch, and is effected by placing the needle straight down six threads. As you finish the sixth stitch, take out the needle at the third thread, and cross it over the centre. On doing other six stitches, cross over in the same manner, and so on. It is indifferent what colours are chosen.

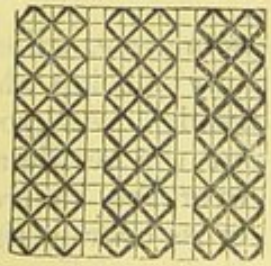
11. *Long Plait.*—Begin by taking twelve threads straight ; work six stitches, slip the needle downward half-way, and then begin another stitch. If striped with gold or silver thread at intervals, where the stitches meet, the effect is very striking.

12. *Feather Stitch.* — This is done over twelve threads, from left to right, in the same way as Tent Stitch, the next row being turned so as to represent the semblance of a feather. The centre is usually stitched up with gold, silver, or silk thread.



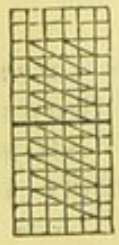
13. *Stitch a-la-Vandyck.* — Twelve threads are taken across, and reduced two threads each stitch, till the width agrees with the required depth.

14. *Point Stitch.*—Ten threads must be taken straight down the canvas, and as many in the next stitch opposite.

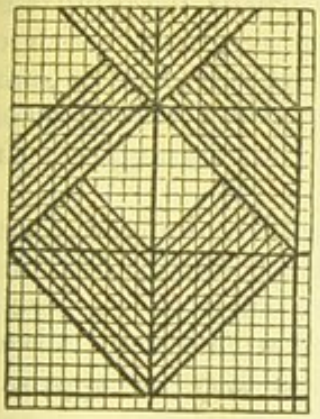


15. *Square Plait.*—The lengthway of the canvas take ten threads deep, and work ten stitches straight ; then work ten threads the width of the canvas, and so continue. For the full display of this stitch, bright colours should be placed in opposition.

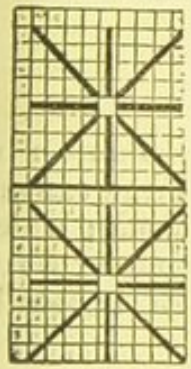
16. *Gobelin Stitch.*—Take two threads in height, and one in width.



This stitch formed over card or straw placed between two threads of the canvas, has a very pretty effect. Shades of the same colour in vandykes, whether dark blue and gold, scarlet and green, azure and lilac, &c., have a charming effect in bags of different colours.



17. *Perspective Stitch.*—Twelve threads having been counted the cross way, take the needle out with two threads at the top; proceeding after this fashion to take seven stitches and five stitches, finishing with any appropriate colour, and filling in with silk.



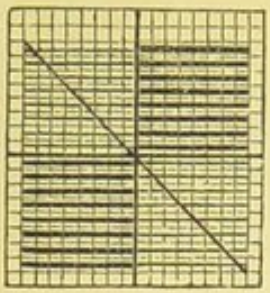
18. *A Star.*—Six threads must be taken four opposite ways, and after that four stitches between a bead in the centre of each. The stars should be judiciously varied in colour, and worked in silk canvas.

19. *Velvet Stitch.*—Three straight rows are to be worked downwards of Cross Stitch, leaving four threads. Three rows more of Cross Stitch are then to be executed; and so proceed till it is finished. Over the space that is left, work (over strips of cardboard) with four threads, Economic Stitch double crossed at each end, and cut down the centre with a penknife. This has the effect of velvet in lines, and is very elegant.

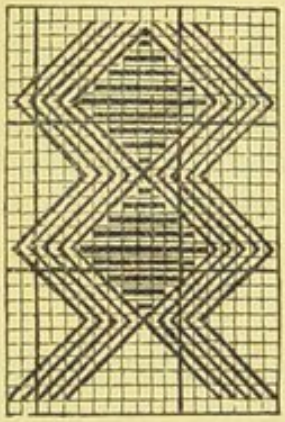
20. *Serpentine Stitch.*—This is sometimes called Spiral Stitch, and is executed by taking five threads straight; after that, five stitches on two ascending threads; then one stitch on nine ascending threads, and five as before. In descending, take five stitches on two threads, one stitch on nine, five on two ascending, five descending, and so on to the end. The fifth stitch is the top stitch of each row.

21. *Double Star.*—Stitch on two threads, crossway, twenty-two stitches square, on silk canvas. Taking eight threads each way, commence the star in the centre. Bright colours are desirable, with a brilliant centre of silver, gold, or steel beads.

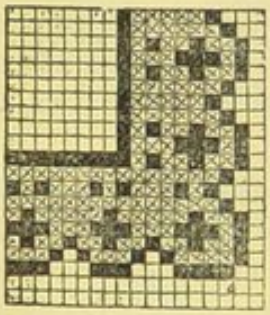
22. *Crossed long Stitch.*—Ten or twelve threads deep must be taken, and worked to the required width of canvas. Continue the next row in the same manner, and with gold or silver thread cross every eight or twelve stitches throughout the pattern.



The introduction of gold and silver thread has a surprisingly beautiful effect, provided the substrata of colour are such as to give it relief. Gold contrasts well with green ; silver, with blue and purple. The more vivid tints may be approximated by the shades of colour introduced between them.



23. *Fancy Stitch.*—Over any number of threads take five stitches, reverse the canvas, and work other five to meet them ; which leaves a space of canvas of diamond form, where rich coloured silk can be tastefully filled in.



24. *Lace Stitch.*—This is one of the most beautiful in the whole range of stiches, and is commonly executed in black Chantilly silk, both in Cross Stitch and in Straight Stitch, so as to arrive at a sort of dice pattern, and the edge is finished with wool in Cross Stitch. A resemblance to a pearl edge is given by taking two threads straight beyond the pattern.

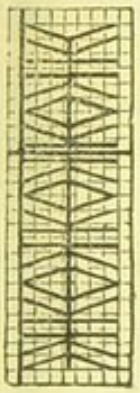
25. *Princess Stitch.*—You must begin with two threads, and increase two each way till fourteen threads are covered ; after which commence again on two threads, and increase to fourteen as before. A variety of colour should be alternately used.

26. *Hohenlinden Stitch.*—Begin by taking eight threads down the canvas, and increase the stitches one thread each way up to

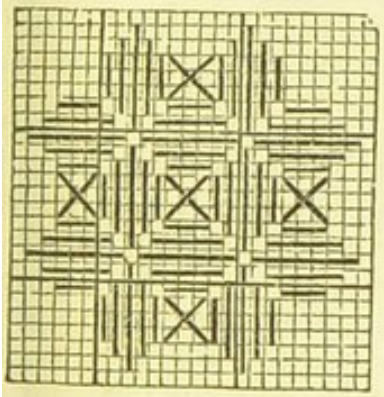
twelve threads ; after which decrease to eight. Proceed thus : the second row being commenced with twelve threads which meet the long stitch in the first row. After this, the diamond space which remains must be worked in gold-coloured silk, in an opposite direction to the first row.

To a German princess, as remarkable for her beauty as for those amiable traits which captivated one of the bravest and most accomplished men of his day, we must refer the invention of this stitch.

27. *Cane Pattern.*—Ten threads being taken across the canvas, leave one thread between each stitch to the end of the row. After this take four rows of Irish Stitch down the canvas in shaded colours, which may be varied throughout.

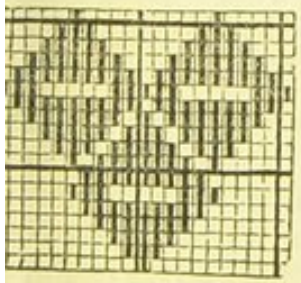


The rapidity with which this stitch can be worked, and the finish and neatness of its general effect, render it one of the most useful employed. Its narrowness is suggestive of that kind of bordering which would interfere least with the bolder and more massive character of subjects forming the central portions of the work.



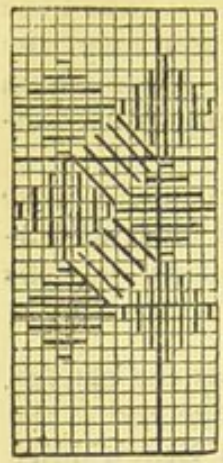
28. *Sutherland Stitch.*— This stitch has a very charming effect worked as plate, with beads in the spaces worked with gold or silver thread. Having taken twelve threads the width of your canvas, reduce a stitch one thread each way for six rows, the last being on one thread. Proceed thus, executing the next row in the same manner, the stitch being the long way of the canvas.

29. *Darmstadt Pattern.*—Take one stitch straight over two threads, increasing two threads each way until six threads are covered : the needle must be taken out at the centre of the last stitch. Now take four threads, increase to six—decrease—form a diamond ; and work up the space in its centre with silver or gold thread or steel beads.



It is scarcely possible to form a conception of the effect produced by this pattern when the colours are skilfully selected, unless it be seen on a larger scale.

30. *Palace Pattern.*—For this very pretty pattern, one stitch must be taken over two threads, the long way of the canvas, one thread being increased each way until eight threads are crossed—then decrease to two threads. Proceed in the same way for the next diamond, filling in the spaces with silk in bright colours.



This is one of those designs which never wearies the eye, possessing within itself great variety of outline ; and so natural is its arrangement, that notwithstanding the angularity of its character, it never offends by the obtrusiveness of one portion over another.

31. *Plaid Patterns.*—These should be worked in Cross Stitch, and may be copied from ribbons, or the new Berlin patterns of the various Clan Plaids, which look extremely elegant, and are very correct.

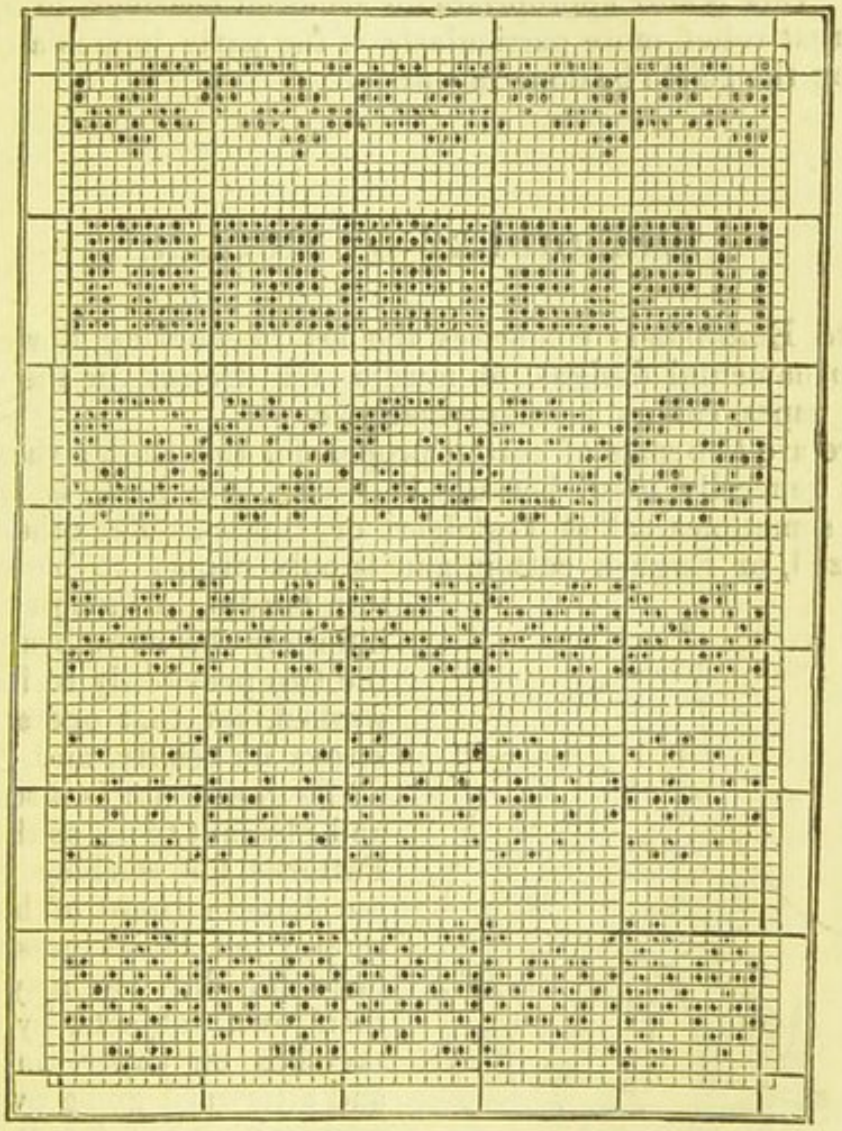
32. *Diamonds.*—Two threads are taken across the canvas, increasing one each way to fourteen, and decreasing similarly, so progressing throughout. For the next row two threads are to be taken down the canvas, increasing and decreasing alternately. Finish with steel, silver, or gold beads, or all three.

Grounding.—Begin from the centre and work downwards, and you will thus avoid soiling the wool. In Cross Stitch work one way, and afterwards cross back. To prevent fastenings of wool from coming together, leave off before you come to the fastenings of the row preceding. Take short needlefuls of wool for light grounds, so as to preserve the colour free from soil. Draw the ends through, as you conclude, on the wrong side, and cut them close off. In grounding in Tent Stitch on a dark ground, work straight across from right to left. Tent Stitch in single wool must not have more than fourteen threads' canvas to the inch : Cross Stitch twenty threads.

General Instructions.—When coarse canvas is chosen for working in Cross Stitch with double wool, it should be of eighteen threads or more to the inch. On ten-thread canvas, the pattern should be worked in single wool, in Cross Stitch, on one thread. Let the grounding be in Cross Stitch, on two threads. Silk canvas requires no grounding, and should be worked in Tent Stitch.

In working drawings on canvas, begin with the dark shades,

commencing with the darker portion of the flower or leaf. Soften these in the various shades, as in the original pattern. Silk should be introduced last, for the lightest shades in the pattern. Landscapes require much care, particularly in the feathery character of trees, which should be varied in tint and in depth or lightness.



Patterns.

Avoid by all means, the conventional bright green and blue patterns of many of the modern school, which resemble nothing in nature; choose, on the contrary, those patterns which have the most judicious admixture of colour, such as an artist would employ in a water-colour painting—making, of course, some allowance

for the greater force in the foreground which Berlin Work admits of. A sunset has a very beautiful effect, but it requires much skill to soften the hues from glowing red to pink, a greenish hue, purple, and deep blue.

In figures, it is desirable to execute the face and hands in Tent Stitch, and the hair and drapery in Cross Stitch. A mixture of silk and wool adds to the effect by the greater brilliancy of the former. Silk is also appropriate for armorial bearings, to which it gives great relief, more particularly if the parts immediately surrounding the shield be done in worsted.

EMBROIDERY ON MUSLIN.

White Embroidery comprises the art of working flowers, and other ornamental designs, on muslin, for dresses, or their trimmings; capes, collars, handkerchiefs, &c.

There are two sorts of cotton proper for this work; that which is most generally used, because it washes the best, is the dull cotton, sometimes called Trafalgar, or Indian. The other sort is the glazed, or English cotton, and is only proper to be used on thin muslin; although it looks infinitely the more beautiful of the two previously to its being washed, yet that operation destroys its beauty, and removes all its gloss; nor is it so smooth and pleasant to use as the other. Patterns for working may be purchased at most of the fancy-shops; but ladies possessing a taste for drawing may design their own subjects, by making sketches on paper, in pencil, and afterward going over them again with ink. A pattern may be copied, by placing a thin piece of paper over the original, and tracing it through against a window. The outline of a subject already worked, if of a thick, rich description, may be obtained by laying the muslin on a table, placing a piece of white

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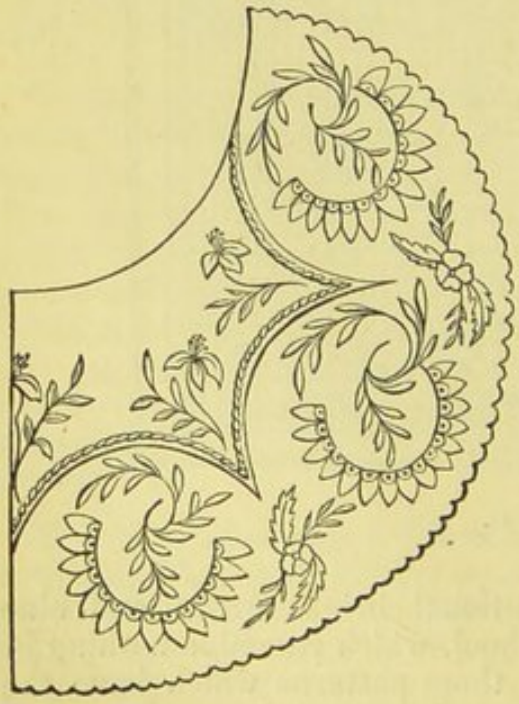

paper over it, and rubbing the paper with a nutmeg, partly grated; this outline may afterwards be perfected with a pen.

The paper pattern for a running design of flowers, foliage, &c., should be from twelve to eighteen inches long, in proportion to its breadth, and shifted along the muslin as the work proceeds. As this sort of pattern is liable to be soon damaged, it is advisible to strengthen it by a lining of cambric muslin. The pattern for a cape of a dress is usually of the size of the intended cape; but a sketch of one half of the pattern (fig. 2) may be made to answer the purpose equally well, by retracing the design on the other side of the paper, against a window, and when the half cape is worked, turning the pattern over to the other side; in this case the half pattern must terminate exactly at the middle, or half of the work. The muslin, cambric muslin, or French cambric, intended to be worked, must be smoothly and evenly tacked on the pattern, so as to prevent its getting out of place; the stems and external edges of leaves, flowers or ornaments, must then be traced, by running them round with cotton (fig. 3): great care should be taken to preserve their shape and form accurately, as a fault in this stage of the work is not easily remedied afterward. In working the bottom of a dress, flounced cape, or collar, the edge of the pattern, which is usually a running scallop, a series of scallops, forming larger ones (fig. 4), a vandyke, or a chain, should be done first. The best and strongest way of working this part is in the stitch used for button-hole work. The stalks leading to leaves or flowers, having been run round as directed, must next be sewn over tolerably thick (fig. 4). Where it appears desirable to thicken a stem or any other part of the outline, a piece of the cotton should be laid along the running thread, and both be sewn over together. Leaves or flowers are worked in what is called satin-stitch (from the length of the stitches resembling the threads in satin): but great care should be taken that the stitches do not lie over each other, but are evenly ranged side by side (*vide* fig. 4). Flowers or stars worked in fine worsted or crewel, of various colours, may be used with very good effect in satin-stitch. The work should be slightly pressed with the finger, now and then, to assist in keeping it in shape.

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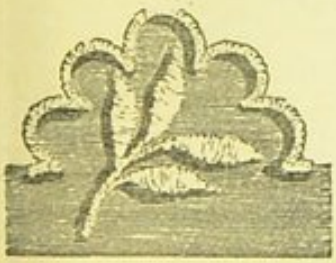

Round eyelet holes, or oval ones, in a circle, like a star or the

head of a flower, are sometimes introduced. These are first run round; then a very little bit of the muslin is cut out in the shape of the intended hole, but much smaller, and sewn thickly round; the needle being run through the centre and passed under the running thread (fig. 5). A leaf or the head of a flower is formed, occasionally, by placing a piece of thread-net on the muslin, then running it round in the pattern required, and covering the running thread in button-hole stitch or thick sewing; the outer part of the thread net is then cut off with fine-pointed scissors, and the muslin under the net cut out in the same way when removed from the paper pattern (fig. 5).

5

The middle of a flower is sometimes ornamented by the intro-

6

duction of very beautiful open work, in imitation of antique Lace;

but the various kinds of stitch requisite, and the mode of using them, are so complex and intricate, that a practical description is scarcely possible; and nothing but personal instruction can properly convey a perfect knowledge of their application. We shall, however, endeavour to illustrate the subject by an engraving of a fancy sprig of leaves and flowers, in the style of rich Antique Lace Embroidery, and attempt to convey a general idea of a few of the stitches used, of which sixteen distinct kinds are comprised in this pattern (fig. 6). Several portions of the leaves and flowers are shown on a larger scale, with references to the various stitches of which they are composed, in figs. 7, 8, 9, and 10.

The stalk is composed of rows of eyelet holes, which are an agreeable variation from the usual mode of sewing stems. The running-thread, which first formed the outline, is withdrawn; and the slight marks left in the muslin, serve as a guide for further operations. Four threads of the muslin are taken on the needle and sewn over three times, the needle being passed through the same places each time, and the four threads drawn tightly together. The next four threads, higher on the line, are then taken up and sewn over, as the last; thus, a series of bars is formed—the thread passing alternately on the right side and on the left, from one bar to another: care must be taken to keep it at the side, and not to let it run across the apertures. Having proceeded the intended length of the stalk, the sides of the holes must be sewn down; the needle being passed through each aperture three times, including, within the sewing, the alternate threads before mentioned as running between the bars.

The outline of the leaves in *feather-stitch* (fig. 7), being run round, each separate leaf is done with fine glazed cotton, in an elongated button-hole stitch, from the centre vein to its outer edge, the stitch being gradually shortened towards the points: the threads of the muslin will thus be divided in a line up the middle, which must be filled up in glover's-stitch: this resembles the button-hole stitch, except that each stitch is taken a little higher up than the preceding one. The outer edge and the outline of the separate parts of the leaf (fig. 8), comprising a variety of stitches, are run round; the rigth-hand edge of the leaf is composed, alternately, of feather-stitch and a pattern worked, with glazed cotton, in double button-hole stitch, in which two stitches are taken side by side; then an equal space is left, and two more are taken; and thus to the end. The next row is formed by placing similar stitches under the alternate spaces left

7

above, taking in, each time, the threads which run between each pair of stitches. The parts opposite (*a a*) are done in half-herring-bone stitch, the cross way of the muslin, four threads being taken on the needle at a time. In forming the second and succeeding rows, the needle passes through the lower side of the first row of apertures. The ground (*b*) is composed of a series of lines, each formed by drawing together and sewing over very closely with fine thread, six threads of the muslin. Square spots are formed in the spaces, by sewing, in glazed cotton, over eight of the cross threads; passing the needle, alternately, over the first four, and under the second four. The large rosette (*c*) is worked in feather-stitch. All the other stitches used in this leaf are described in the succeding flowers.

8

The cup (*a*) of the fancy flower (fig. 9) is done in feather-stitch. The centre is a series of eyelet-holes, formed by passing the needle twice through the same hole; then repeating the same process at the distance of four threads; and so, in succession, to the end of the row. The second row is formed at the spaces between the holes of the first row, with four threads between each, as before, so that the holes of each row are perfected in the following row. The part (*b*) is done in half-herring-bone stitch, leaving four threads of the muslin between each row; (*c*) is formed, by drawing together, and sewing over tightly four threads of the muslin between each row; (*d*) is worked in double-button hole-stitch; (*e*) is the same as the centre, with spots in satin-stitch. The centre of a fancy flower (fig. 10), is in *half-herring-bone stitch*, worked in glazed cotton. The small eyelet holes (*a*) are formed by taking up two threads of the muslin all round; by the sides of them is a stitch like the cross-stitch in marking, and a short stitch passes over each end of the thread, forming the cross; then follows another eyelet-hole and a cross, and the subsequent rows are done in a similar manner: the eyelet-holes in each line being invariably placed under the crosses of the line

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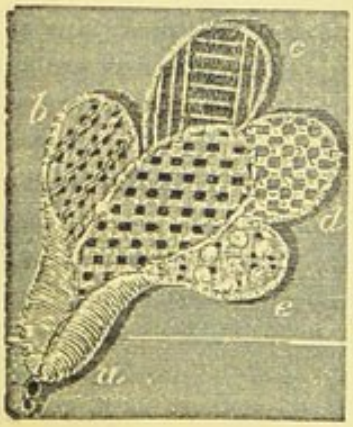

above. The series of holes (*b*) is formed by sewing over four threads in a cross direction of the muslin, then passing to the next four, and thus till the line is finished; the following rows are done in the same manner, until all the space is filled; the holes are then sewn over in a similar way, but in the contrary direction. At (*c*) six cross-threads of the muslin are drawn together by passing the needle underneath, from one side to the other, and then in contrary directions, thus forming a little spot. The part (*d*) is formed by sewing over four threads of the straight way of the muslin, and leaving four threads between each stitch; the same line is sewn back again, so as to form a cross over the top.

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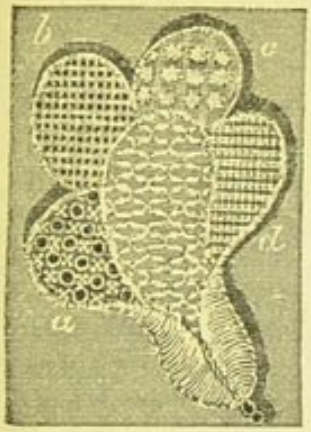

These stitches are susceptible of an endless variety of changes, by introducing spots, bars, or cross lines, in satin-stitch; and in the half-herring-bone stitch, by changing the direction of the threads, or leaving spaces, as fancy may dictate. The use of glazed cotton instead of fine thread will also give a very different effect to the same stitch. The edge of each flower, and of each compartment of a flower, is to be sewn closely over with glazed cotton. It is not expected that these imitations of Antique Lace-work should be practised on the extended scale here described; the separate stitches may, however, be introduced as taste may direct, to fill up the centres of modern flowers, or fancy leaves.

Muslin, worked with glazed cotton, was formerly called *Dresden-work*, but is now known by the name of *Moravian*, from its production having formed the principal employment of a religious sect, called the Moravian Sisters, which originated in Germany, and some of whose establishments exist in this country; the shops in London, called Moravian warehouses, were, originally, opened for the sale of their work; though they are now become ordinary depôts for the various kinds of Fancy Embroidery produced by the immense numbers of young females who in this country derive their maintenance from the ever-varying use of the needle.

Strips of work intended for insertion in plain muslin, or lace, should have a row of hem-stitch on each side, which is thus produced: A margin of the muslin is left on the sides of the pattern, sufficiently broad to wrap over the finger; at a few threads distance from the work, on each side, threads are drawn out to the width of a narrow hem; and three or four threads, which cross the space thus formed, are taken upon the needle (beginning at

one side of the space), and sewn over with very fine cotton, about three times, when the thread will have reached the other side; at which point three or four more of the cross-threads are to be added, and the whole sewn twice over, so as to tie the six or eight together at that side: the last number taken up must be then sewn over three times, as the first: by this time the thread will have reached the side from which it first proceeded; fresh threads are then added, and tied, each time, at the sides, as before; and so on, from side to side, to the end. Three or four threads are to be taken at a time, according to the width of the space formed by drawing the threads out. The whole hem-stitch, when completed, forms a sort of zigzag (fig. 11). The muslin is joined, by its outer margin, to whatever article of dress it is intended to adorn.

11

Another species of hem-stitch is called *Veining*, and is introduced to give the same appearance as the regular hem-stitch, in curved, or other positions, which would not admit of drawing the threads out (fig. 12). It is done on the angular direction, or bias of the muslin, by sewing over two threads of the muslin one way, then taking up two threads of the contrary way, tying them together at one side, as directed in the straight hem-stitch; then sewing over the latter two threads twice: after crossing to the opposite side, two more are sewn over; and so in continuity, according to the direction required.

12

Cambric pocket-handkerchiefs are generally ornamented with a row of hem-stitch, bordered by a broad hem, or with the outer edges scalloped, and a small pattern embroidered in each scallop. It is fashionable to have the corners embellished with a fancy sprig, and, frequently, with a different pattern in each. Embroidered initials and crests, in one corner, having a very beautiful effect; they are usually surrounded by a wreath of laurel, or some fancy device, in which the leaves and stem are worked in satin-stitch, relieved by a row of eyelet holes. In working the letters, which are also in satin-stitch, great care and delicacy are required to preserve their proper shape, by lengthening or shortening the stitches, so as to correspond with the varying breadth of the written characters in the pattern. A coronet, or crest, may be worked in satin-stitch, varied with eyelet holes, or any other appropriate stitch, according to the subject (fig. 13).

13

LACE-WORK.

The making of Lace is not now among the pursuits of ladies; it will, therefore, be unnecessary to enter into its details: in a previous part of this article, however, we have given such general information on the subject, as will, probably, have proved interesting. The only branch of Lace-work which seems to come within our plan, is *Embroidery on Net*, in imitation of Brussels point-lace, which, for veils, dresses, or their trimmings, is very beautiful in its effect, and, perhaps, exceeds in delicacy every other branch of White Embroidery.

Embroidery on Net is performed by placing a piece of French cambric, of a size proportioned to the subject, over the net, and the paper-pattern under both. Then the design (of which each particular leaf, (or sprig, ought to be very small, though the clusters should be large) must be run twice round with cotton, the running thread sewn over pretty closely with rather finer cotton, and the external edges of the cambric cut neatly and closely off (fig. 14). In designing a veil, a small running pattern, worked quite at the edge, is proper; and, when completed, a pearling (which is a species of lace-edging, to be had at the lace-shops) should be sewn round the outside, to give it a finish: on the lower part of the veil, within the running border, there should be a handsome pattern worked across. This style is very easy of execution, and is an excellent imitation of what it is intended to represent. Net is also worked by running the outline of leaves and flowers with glazed cotton, darning inside the running with fine cotton, doubled, and filling up the centre of the flower with half herring-bone stitch, from one side to the other (fig. 15). Instead of darning within the flower, chain-stitch is sometimes introduced, and which is thus performed: Having secured the cotton, one thread of the net is taken up, and the cotton being held down by the left thumb, the first stitch is taken, as in button-hole work, leaving a loop, through which the needle is passed, to form a second stitch or loop, and so on, after the manner of a chain; until, having

14

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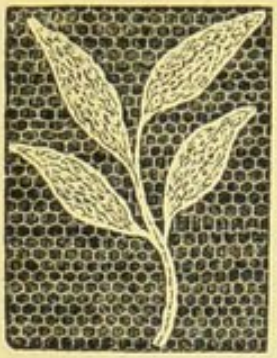
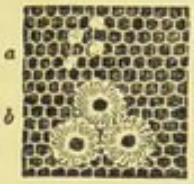
arrived at the extremity of a leaf or flower, the cotton is turned round and worked back, until the whole space is covered (fig. 16). An agreeable variety may be introduced among the flowers, by filling up their centres in a stitch formed by sewing over two threads across the space; then leaving one row of threads, and taking up the next two, until the interior is completely occupied. This kind of stitch may be varied by crossing it with the same stitch. Small clusters of spots, on net, are very pretty: each spot is formed by passing the needle backward and forward through one mesh, and, alternately, over and under two of the threads, forming that mesh, which are opposite to each other (fig. 17, *a*). Sprigs, or branches, formed by eyelet-holes, either singly along a stem, or in clusters of three, afford a pleasing variation (fig. 17, *b*). The eyelet holes are worked in button-hole stitch; one mesh of the net being left open for the centre.

16



17



Book Muslin is sometimes worked into net, by placing it under the net, and both over a paper pattern; the outline is then run round: the running is either sown over, or worked in button-hole stitch, and the external edge of the muslin cut off. This mode is not confined to small patterns, as the cambric or net which is intended to resemble Brussels point-lace.

GOLD-THREAD EMBROIDERY.

This, in splendour and richness, far exceeds every other species of Embroidery, and is principally used in court dresses, and for the ball-room. It is practised on crape, India muslin, or silk, and principally, in large and bold designs. The gold thread should be fine; and it may be worked with nearly the same facility as any other thread. Where the material is sufficiently transparent, a paper pattern is placed underneath; the outline is run in white thread; and the subject is then worked with gold thread, in satin stitch. For a thin stalk to a flower, the running-thread should be omitted; and gold thread laid on the material, and sewn slightly over with another gold thread; thus giving the stalk a very pretty spiral appearance. In embroidering a thick material, the design is to be sketched with a black-lead pencil, if the ground be light; or with a white-chalk pencil, if dark. The pattern is frequently varied by the introduction of short pieces of fine gold bullion; sometimes two

or three of them coming out of the cup of a flower; the stitch pass lengthwise through the twist of the bullion, thus confining it flat. The centre of a flower may be also finished with bullion: in that case, the stitch taken should be shorter than the piece of bullion; the under side of which will therefore be compressed, and the upper side expanded, so as to give it a little prominence.

Gold spangles may be occasionally introduced; and they should be secured by bringing the thread from beneath, passing it through the spangle, then through a very short bit of bullion, and back through the hole in the centre of the spangle: this is better than sewing the spangle on with a thread across its face.

Gold-thread flowers on tulle form a beautiful Embroidery, and are worked in the same way as the thread net represented in fig. 15. This material may also be worked in gold-thread satin-stitch, or at the tambour. The whole of this kind of Embroidery is also worked in silver thread.

There is a beautiful variety produced by the introduction of flos silk, worked in satin-stitch, in any one colour that will harmonise with the gold or silver thread. The effect of green flos with gold thread, is particularly good, when tastefully arranged; as, for the lower part of a dress, in the combination of a wreath of the shamrock in green flos silk entwined with roses, or other flowers, in gold or silver thread.

BRAID-WORK.

This beautiful and easily executed work has of late years been brought to the highest perfection, both as regards the variety, qualities, and colours of *Braids*, and the appropriate designs for it. The stiff, old-fashioned style of pattern has been superseded by the elegant and graceful outline of flowers, leaves, or sometimes even ornamental architectural designs; the whole being formed by one continuous line.

In Turkey, and other countries of the East, Braid-work has for centuries been used to ornament the dresses of the higher classes. The *Oriental* style is somewhat formal, its chief beauty being in the elaborate and massive pattern, which is peculiar to themselves, though some of our highly ornamented military uniforms may be said either to imitate or resemble theirs.

As it is not in the compass of the present work to give anything more than a specimen of each kind of ornamental needle-work, we herewith present an engraving (fig. 18) of one of a pair of Hand-screens, which may be composed of white watered silk, braided with gold-coloured silk pearl braid, fringed with a crimped

fringe the same colour, about four or five inches deep. These form a very elegant and useful birthday or wedding present.

18

Hand Screen.

19

No. 1 of a Set of Doileys on White Marseilles.

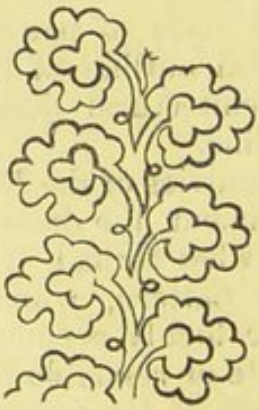
Fig. 19 is one of a set of Doileys, worked with white or coloured worsted braid (*scarlet* is the best for washing). The *edge* is button-stitched, and the initials in the centre worked in chain or tambour-stitch.

Fig 20. is a very pretty pattern for a Cushion, arranged alternately on scarlet and white *French* merino.

20

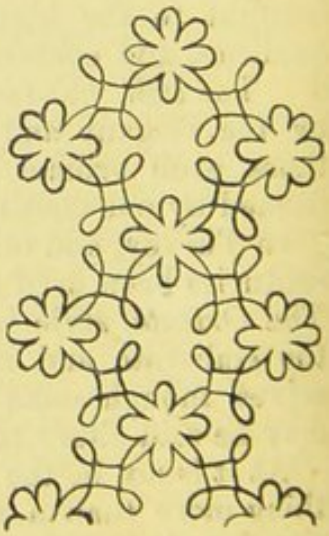
For a Cushion, arranged alternately on Scarlet and White French Merino.

21



Border.

22



Border.

Figs. 21 and 22 may also be used for the same purpose, or for bordering, &c.

As the size of the pattern would be useless on this small scale, we will only enumerate a few of the favorite articles which ladies are in the habit of Braiding. Children's Dresses, Jackets, Collars, Aprons, Waistcoats, Slippers, Bags, Doileys, Table-cloths, Satchels, and Anti-macassars, &c., &c. Suitable patterns for any of these articles may be stamped on ladies' own materials, by Mrs. Simpson, Designer for Braid-work and Embroidery, Newcastle-on-Tyne, and many other artists of this kind, both in town and country.

SEWED MUSLIN WORK.

So much of this kind of Embroidery is now done, that it is not necessary to give anything more than a few hints, which may be found useful to such as are not experienced in the art.

The pattern must be traced the same as fig. 3, page 365, before cutting out the holes with very small-pointed scissors. The cotton must be of suitable quality for the muslin.

LADY'S NIGHT-CAP.

We subjoin a pattern for a lady's Night-cap; the little star-flowers being worked in satin-stitch, and all the rest in holes.

24

Lady's Night-cap (Head-piece).

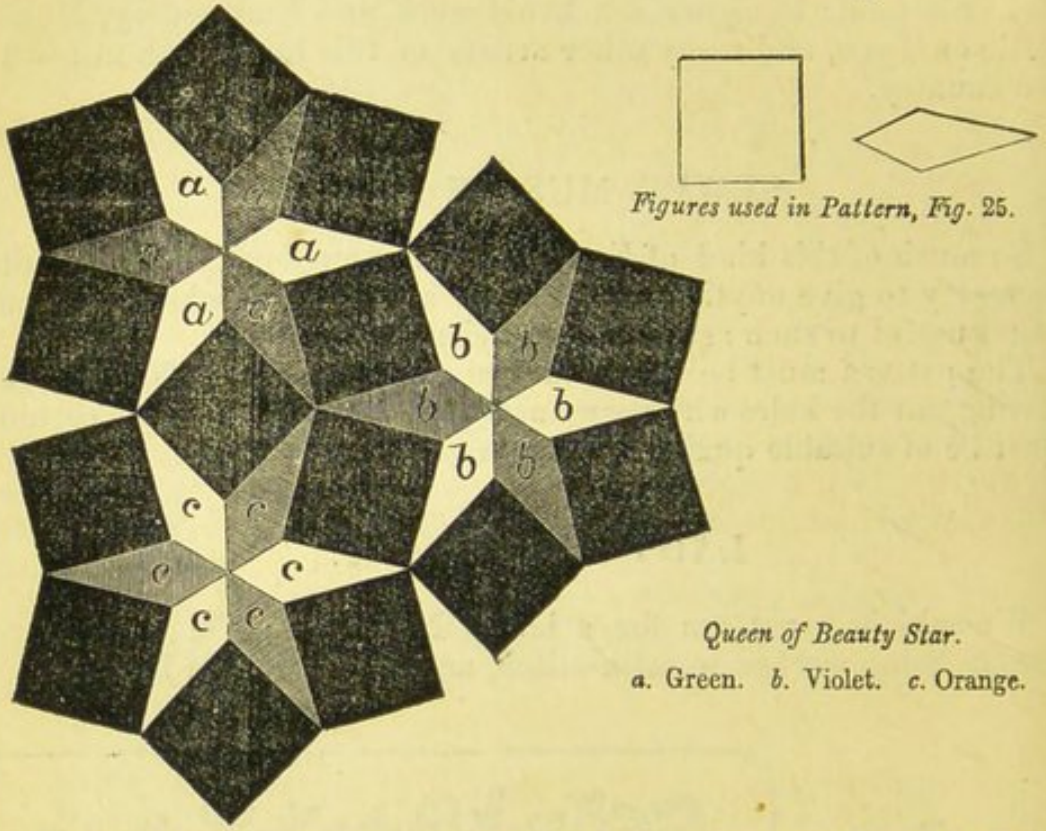
23

Lady's Night-cap (Crown).

PATCH-WORK.

In introducing the subject of "Patch-work" here, we would first point out the great—almost infinite—variety and beauty such work is capable of producing; and, secondly, the advantage it possesses in point of economy, by using up the smallest pieces of silk or calico, which might otherwise be thrown aside as useless.

25 26



Figures used in Pattern, Fig. 25.

Queen of Beauty Star.

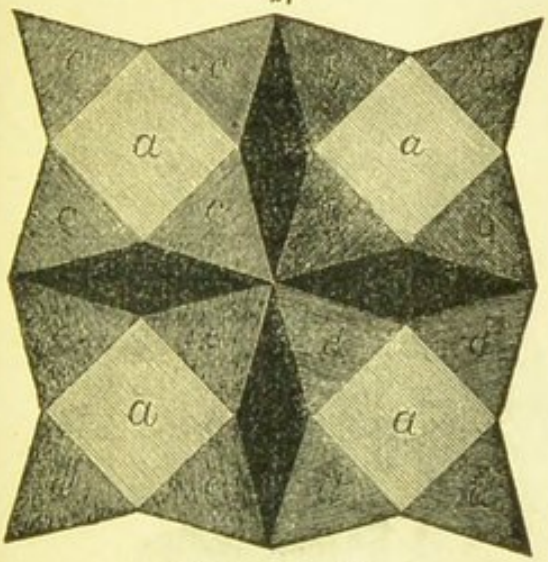
a. Green. *b.* Violet. *c.* Orange.

Before proceeding to give practical directions, we beg to offer a few hints to the uninitiated in the art of Patch-work. For *Silk* Patch-work, we would recommend black velvet to be used for ground-work, but when a sufficient quantity of pieces cannot be procured, black, or any dark-coloured silk or satin, will be the best substitute for throwing out the colours with greater effect. Of course the more complicated designs are meant more especially for *silks*, and may be worked into Cushions, Hassocks, Footstools, Chair-covers, Ottomans, besides Bed-quilts, Table-covers, Borders for Window-curtains, and other small and ornamental articles, such as Mats, Lamp-stands, Pincushions, Sachets, and Bell-pulls, &c.

As everything depends on the taste displayed in the arrangement of the colours, we would have ladies carefully study this particular. Having taken an accurate copy on paper of the figures used to form any particular combination, and decided

on, the *right size* of each, you cut out the same in very stiff cardboard, to serve you to cut out all your *papers* by (letter-paper being found useful for this purpose). You next cut out your patching materials by the cardboard figures, leaving them sufficiently *large* to allow of turning down the edges over the papers, which you carefully tack in, and proceed to sew the different pieces together so as to form the pattern desired.

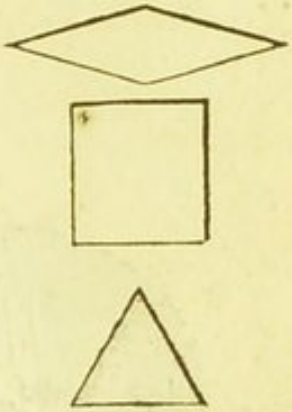
27



Prince Albert Star.

a. Yellow. *b.* Brown. *c.* Green. *d.* Blue. *e.* Red. The remainder Black.

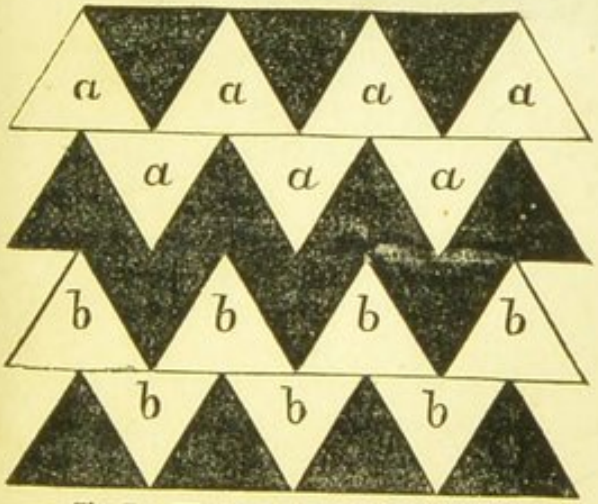
28



Figures used in Fig. 27.

The Zig-zag is a very good pattern for Prints, and makes a pretty Crib-quilt, using white cotton for ground instead of black.

29



Zig-Zag-Wave. *a.* Buff. *b.* Blue.

30

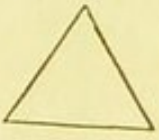


Figure used in Fig. 29.

NOTE.—Other patterns for Patchwork, and indeed for every kind of Needlework, will be found in the *Lady's Newspaper*, pub-

lished at *5d.* For instructions in PLAIN NEEDLEWORK, a subject which we have not thought it necessary to introduce into the present volume, the 'Ladies' Work-table Book,' *illustrated with diagrams* (published by H. G. Bohn, 1852, *2s. 6d.*), may be consulted with advantage.

From a Painting after Guido. *Engraved by S. Allen.*

THE ESCRITOIRE.

For careless scrawls ye boast of no pretence;
Fair Russell wrote, as well as spoke, with sense.

ARIOUS are the occasions on which ladies are called upon to exercise their skill in the art of epistolary composition: this, generally speaking, is the only style of writing of which they will find it inconvenient to be ignorant. Few persons are ever obliged to produce a treatise or a poem; but there is scarcely any one who is not occasionally compelled, by the circumstances of life, to write a letter. It is the remark of a very celebrated author, that the epistolary styles deserves to be cultivated almost more than any other, since none is of more various or frequent use through the whole subordination of human life. Another writer on this subject very justly observes, that among the various parts of learning, in which young persons are initiated, there are some which, though they amuse the imagination, and furnish the mind with employment in solitude and leisure, yet are found to be of little actual utility in the common intercourse of life; but the ability of writing letters clearly, and to the purpose, finds an opportunity of frequent exertion and display in every department of business, in every profession and employment, and in all the endearing offices of

social relation. Most authors, who have occupied themselves with this subject, admit the difficulty, or rather, the impossibility, of reducing it to any fixed rules; as letters are written on all subjects, and in almost every situation in which "the tide of events" can carry individuals. The general rules which govern other styles of composition are, for the most part, applicable to letter-writing; ease and simplicity, an even flow of unlabored diction, and an artless arrangement of obvious sentiments, have been pronounced to be the qualities most frequently required; but it has also been stated that a letter, having no peculiarity but its form, nothing is to be refused admission to it which would be proper in any other mode of treating the same subject. This observation requires to be qualified; at least, as to the manner of using what is admitted. Brevity is often an object of the greatest importance in the epistolary style; and that which it may be proper to elaborate in other modes of treating a subject, it is necessary to condense in a letter: the same arguments and expressions, also, which would be proper in a statement, or appeal to the public, might be indecorous if addressed to an individual.

Although it may not be in her power to offer a complete series of rules for epistolary correspondence, the writer of this article ventures to hope, that she may be enabled, in the course of the following pages, to make some observations, which will be found of considerable benefit; at least to the younger and more inexperienced portion of her readers.

A correspondence between two persons is, simply, a conversation reduced to writing; in which one party says all that she has to communicate, replies to preceding inquiries, and, in her turn, proposes questions, without interruption by the other, who takes precisely the same course in her answer. We should write to an absent person, as we would speak to the same party if present. To a superior we ought to be respectful; to a parent, dutiful and affectionate; to a friend, frank and easy; and clear and definite in our expressions to all. Ambiguity, in epistolary correspondence, is a fault which ought, most scrupulously, to be avoided; a word placed in an improper part of a sentence—a phrase that has a double signification—a passage so blotted or ill-written, as to be unintelligible—a careless mode of sealing, by which a portion of the manuscript is broken or concealed, will often render it necessary for the party receiving the letter to write, and she who is guilty of the fault, to reply to another epistle, requiring the necessary explanation. The delay thus occasioned is often of serious importance: besides, the person addressed may conceive that she has caught the import of the doubtful passage, when the contrary may be the fact; and thus the writer, much to her own

detriment, may be misunderstood on a most critical point; in fact, to be ambiguous, or unintelligible, is to be wanting in duty to ourselves, and in respect to those whom we address.

Conciseness is one of the charms of letter-writing: we do not mean to say that a letter should not contain sufficient facts, ideas, and feelings; but they ought to be as briefly expressed as perspicuity and elegance will permit. If we encumber an idea with verbiage, it loses its power. There are some persons who, when they express a feeling or a thought, of which simplicity should be the charm, clothe it with all the verbal treasures they possess; this is like wearing one's whole wardrobe at once—the figure is lost in the mass of drapery. Lengthened periods are as much out of place in a letter as they would be in conversation, of which letters may be called the prototype; for they tire the reader even more than they would the hearer. Our style, of course, may rise with our subject; but all parade of words should be dropped in a familiar epistle. The death of a friend or relation, a calamity, or any circumstance of grave importance, should not be communicated in the same manner as a trifling occurrence, or even a happy event; brevity, in *these* cases, is beauty; in *those* it would be deemed unfeeling and abrupt. "You ask me to send you news of your favorite schoolfellow, Harriet: she is married." This mode of communicating such an event is unexceptionable: but it would be most improper to state the young lady's death in the same manner; that is, by merely substituting "dead" for "married."

But in aiming at the acquirement of an elegant and easy brevity, it is incumbent on us at once to avoid falling into a rugged, or an enigmatical style, and becoming so concise as to be unintelligible. Boileau, echoing Horace, says, "J'évite d'être long, et je deviens obscur." This is a fault which must be avoided: it is even better to be prolix and intelligible, than brief and obscure.

To an absent friend, an elaborate letter will be most welcome; a stranger, a superior, or a person of whom the writer seeks something, will recoil from a "folio of four pages," and, perhaps, throw it aside unread, or at best, but slightly skimmed over. Above all things avoid the too common practice of crossing letters, with the view, it should seem, of economising paper or postage, both now cheap enough. When the party, to whom a letter is addressed, is uninterested in the subject on which it is written, the writer of it should display a brevity, which will attract attention and ensure a perusal: no unnecessary ornament should be used, nor, in fact, anything introduced but what is important and bears strongly on the case stated, or the inquiry made. All those little personal details and trifling circumstances, which are so delightful in a letter from a friend, would fatigue and disgust a stranger, or a superior, to whom they are destitute of interest.

Display is a fault of great weight; ease is the grace of letter-writing: far-fetched words, and studied phrases, are by no means to be accepted as legitimate ornaments in the epistolary style. A passage which is at once brilliant and brief, enriches a letter; but it must be artless, and appear to flow without effort from the writer's pen—to arise naturally from the subject, or the preceding passages, and not seem to have cost any labour in its production; or to be placed in the position it occupies, simply because it is beautiful, and not on account of its relation to its fellow-phrases. There are some persons who have their pet expressions, which they display as they would their diamonds, on all possible occasions; these expressions would be good, if they were in their proper places; but, on account of their misapplication, they appear forced and unnatural. It is, however, by no means intended, that these observations should be understood by the reader as warning her to reject those ornaments and graces of language, which embellish other styles of writing, when the occasion calls for their aid. Dr. Johnson observes, that "it is natural to depart from familiarity of language upon occasions not familiar. Whatever elevates the sentiments will, consequently, raise the expression; whatever fills us with hope, or terror, will produce perturbation of images, and some figurative distortions of phrase. Whenever we are studious to please, we are afraid of trusting our first thoughts, and endeavour to recommend our opinion by studied ornaments, accuracy of method, and elegance of style. If the personages of the comic scene be allowed by Horace to raise their language, in the transports of anger, to the turgid vehemence of tragedy, the epistolary writer may, likewise, without censure, comply with the varieties of his matter. If great events are to be related, he may, with all the solemnity of an historian, deduce them from their causes, connect them with their concomitants, and trace them to their consequences. If a disputed position is to be established, or a remote principle to be investigated, he may detail his reasonings with all the nicety of syllogistic method. If a measure is to be averted, or a benefit emplored, he may, without any violation of the edicts of criticism, call every power of rhetoric to his assistance, and try every inlet at which love or pity enters the heart." But, before the letter-writer follows this advice, it is necessary to ascertain the extent of her powers. Without talents to support us in a splendid flight, it is better to pursue an even course. Without judgment to select, and taste to apply ornaments, it is wise to be contented with simplicity; lest, in this case, in aiming to be brilliant, we become gaudy and ridiculous; or in that, while striving to astonish, we become contemptible, and "rise like the rocket, only to fall like the stick." We should never suffer ourselves to

be seduced to adopt a fine-sounding epithet, unless we are perfectly well acquainted with its meaning; or to indulge in a simile, unless we are capable of wielding it with ease. It is dangerous to meddle with fine phrases, if we are unaccustomed to the manner of using them. A person who, by invariably keeping within the beaten path, and never running astray after "the butterflies of language," had been accounted, by his correspondents, a plain, sensible sort of man, destroyed his reputation by a congratulatory epistle on a friend's marriage, written in a style which he, doubtless, considered of great elevation and beauty: it was, on the contrary, in the true "Cambyses' vein." No one had ever suspected him to be a blockhead before; but the letter in question was evidence enough to convict him, even in the opinions of his most partial friends. Perhaps it is the only one of his epistles that has ever been preserved, with the exception of such as have been kept as documents in matters of business.

In all epistolary correspondence, the choice of embellishments, the language, subject, matter and manner in general, should, as in conversation, be governed by the relative situations in life, as to age, rank, character, &c., of the parties addressed and addressing. A lady neither writes nor speaks to a gentleman as she would to one of her own sex. The language of a mother to a daughter, is very different from that of a daughter to her mother. In our first letter to a person, as on our first introduction, we should be respectful, and by no means familiar. The distance which either age, rank, sex, or any other circumstance, occasions, ought always to be remembered. We should never forget what we are, and what the person is whom we address. We should say only precisely what ought to be said—to write, in fact, with the same restrictions as we would speak—to suppose the party present whom we address; and to bear in mind, that our letters are, in every respect, representatives of our own persons—that they may be said to speak for us; and that an estimate of our character and manners is frequently formed from the style and language of our epistles.

How frequently do we hear persons exclaiming, that they do not know what to write about! Such an observation is a disgrace to the person who makes it. Were the mother, the sister, the cousin, friend, or even acquaintance, to enter the room in which you are sitting at an escritoire, with a blank sheet of paper before you, would you have nothing to say? Would you have nothing to communicate? Nothing to inquire? No hitherto-unanswered question to reply to? There is little doubt but that a host of facts, feelings, questions, and answers, would crowd to your lips for utterance. But it will, perhaps, be observed by some, that

"there is such a difference between talking and writing:" truly so; the great difference is, that in this, the pen—in that, the tongue—is the agent of expression. Whatever we should say to a person present, we may write if absent. There is, of course, a choice of subjects to be made, and a proper mode to be chosen of communicating them. To regulate that choice, we should select as though the friend, to whom we are writing, were by our side, and could remain with us but a short time. In that case we should speak only of those things which were of the greatest importance, and express them at once as clearly and concisely as possible; and pleasantly, didactically, modestly, feelingly, or otherwise, according to their nature and the party whom we address. The writer should always bear in mind, that "nothing can be more improper than ease and laxity of expression when the importance of the subject impresses solicitude, or the dignity of the person exacts reverence."

Politeness, and the forms of society, frequently require us to write letters of compliment, inquiry, or condolence, to those with whom we are upon the slightest possible terms of intimacy. Such letters, which are generally supposed to be the most difficult, are, in fact, the most easy of execution; for the circumstance which calls for the letter, affords us a subject; to this the letter must be restricted. It is true, that there is a graceful manner of framing an inquiry, and making a compliment, and this manner it is in vain to seek for, by labour, at the moment the letter is required; if it be difficult to compose, it will seem studied, heartless, and inelegant in expression. Simplicity and ease impart the chief grace that can be given to a condoling or complimentary note.

A letter of congratulation should be as the thornless rose; the least appearance of envy, or jealousy, at the good fortune of those whom we felicitate, is unpardonable; it should contain no hint of any hope that the advancement, or change of situation, upon which the compliment is made, may afford the person addressed the means of conferring a benefit on the party writing. It should, in fact, be an unmixed expression of pleasure and congratulation on the event that calls for its production. Care must, nevertheless, be taken to keep within due bounds; to exaggerate in our congratulations, is to become keenly satirical.

To repeat what has before been said, the style must always correspond with the occasion. In a letter of congratulation we should be cheerful; from an epistle of condolence all pleasantry should be banished; to exhibit the wit which we possess, at such a time, is like smiling at a funeral, to display a beautiful set of teeth. When addressing a person who is labouring under any grievous calamity, it is bad taste to make light of it; by treating that loss

as a matter which a little firmness would enable the party who has suffered it to endure calmly, we irritate, rather than soothe. It is better to enter into the feelings of the mourner,—to eulogise the departed relation — to rebuke the ingratitude of the false friend—to confess the inconstancy of fortune, or otherwise, according to the circumstances; and, without magnifying, to lament the full extent of the condoled party's affliction: thus we seem to share, and, therefore, in some degree, lessen the sorrow of the sufferer. A celebrated lady, in a letter of condolence to a friend, uses this language: "The more I think on the loss you have just met with, the greater it appears, and the more it affects me. He was, indeed, worthy of being the head of such a family as yours, and can never be replaced! We have every reason to believe that he is happy: we should weep for ourselves, therefore, rather than for him. My heart grieves for your situation: it will be long ere you can console yourself for such a separation. If I were mistress of my own actions, I would certainly abandon everything to be near you." This language is balm to the wounded mind, which rejects consolation from those who do not seem sensible of the extent of the sorrow under which it labours. Such a subject must, nevertheless, be treated with a delicate hand; for, by exaggeration, we should aggravate rather than console; and a mere string of bitter reflections, without any concluding ray of hope, being held out; or the least hint that the calamity has been occasioned by the neglect, or imprudence, of the party suffering under its visitation, is like striking the stricken deer.

Letters of inquiry, as their subjects are generally brief, will bear a little verbiage. To be too concise in our inquiries, as to the indisposition of an acquaintance, manifests a carelessness, which may be turned to our disadvantage: but a mere billet of complimentary inquiries should not be lengthened into a formidable epistle; it then becomes absurd. In an application to a superior in rank, or age, for a favour, neither gaiety nor familiarity is tolerated. A request may be made to an equal, and an acquaintance, with smiles; Friendship commands, even when she asks: a friend may, therefore, when soliciting, be pleasant without impeachment. Brunel wrote thus to his friend Fontenelle: "You have a thousand crowns—send them to me." To this request Fontenelle replied, as follows: "When I received your letter, I was about placing out my thousand crowns: I shall not easily find so good an opportunity again—Voyez donc." Brunel's rejoinder was only "Send me your thousand crowns," and Fontenelle sent them.

The forms of complimentary letters of thanks, for inquiries, &c., are extremely simple, being little more than an echo of the in-

quiries, with the writer's acknowledgments for the civility of the inquirer. In letters of thanks for real favours conferred, the language ought to be simple and strong: it should appear to be dictated by the heart: the principal subject must, of course, be the writer's gratitude. The extent of the obligation should neither be magnified nor treated as less than it really is. To hint that the favour conferred shall be returned, or to express a wish that an occasion may offer, for the party benefited to oblige her benefactress, is exceedingly indelicate, and conveys an idea, that the writer feels the favour to be nothing more than a loan, which is to be repaid the first opportunity: although such be the feeling, it is not fit that it should be expressed.

If we confer a favour, and announce the fact to the party whom we have obliged, it is necessary to avoid any expressions that may tend to wound the feelings: it is possible to grant a favour in such a manner as to offend, rather than to delight; to create disgust, rather than gratitude. The language of a letter, which states that the writer has performed an important service, on behalf of the individual to whom it is addressed, should be simple, and void of ostentation. "He that, like Pliny, sends his friend a portion for his daughter, will, without Pliny's eloquence or address, find means of exciting gratitude, and securing acceptance; but he that has no present to make but a garland or riband, or some petty curiosity, must endeavour to recommend it by his manner of giving it."

A letter of recommendation is a letter of business, and should be composed with care: it is a guarantee, to the extent of its language, for the party recommended; truth, therefore, should never be sacrificed to condescension, false kindness, or politeness. To write a letter of recommendation contrary to one's own opinion and knowledge of the person recommended, is to be guilty of a great imprudence.

To say all that is necessary, in a clear and distinct manner, and nothing more, is the grand merit of a letter on business. Pleasantry and pathos would be greatly misplaced in it, unless it be of a mixed nature; that is, necessarily, or properly, embracing some other subject. Brilliant diction is a dress in which directions on business should never be clothed. The style ought to be precise, sufficiently copious, but not redundant. Everything necessary should be stated, plainly and unequivocally; so that the party addressed may be in full possession of our desires and opinions, on the subject of our correspondence. Ambiguity is nowhere so unpardonable as in a letter on business.

It is a maxim with the discreet, never to give advice until they have been thrice asked for it: in many instances, to volunteer it

is to be offensive to those whom you wish to benefit: it is much more pleasant to give than to receive it. Unsolicited counsel is a bitter draught; and even those who crave your opinions, will feel themselves offended if you be forward, as well as frank, in replying to them. A friend should, perhaps, give advice to a friend, if he see occasion so to do, however unpalatable it may be; but, in general, we cannot be too sparing of our counsel.

It is sometimes necessary to write letters of excuse: in such a case, the party must not forget that almost as much depends on the time as the manner of making an excuse: it may be too late to be effective, or so mistimed, as to aggravate the previous offence. A mischievous page concealed himself behind the arras of the court of justice, at Versailles, and fastened the wig of the president to the tapestry, so dexterously, that the latter was totally unconscious of the trick. On the king's entrance, the president rose suddenly, leaving his wig attached to the arras. In the evening, the king discovered the author of the trick; and though he could not help smiling at the recollection of it, he commanded the page to crave pardon of the venerable president. The wag mounted his horse in the middle of the night, rode to the president's hotel, announced himself as a messenger from the king, awoke the president; presented his most humble respects, and begged to be excused for the trick he had played behind the arras in the morning. The president very properly observed, that the apology was worse than the offence. What this page did maliciously, other persons often do inadvertently: they crave forgiveness at improper seasons; the excuse which would be freely accepted to-day, might be indignantly rejected a month hence. A slight notice of the fact, an explanation that will extenuate the offence—an assurance of the total absence of any intention to wound the feelings—regret for the circumstance—professions of attachment, and an expression of earnest desire to recover the good opinion of the person offended—are the elements of a letter of excuse—modified according to the fact, time, and persons interested. It is sometimes necessary to make excuses for offences not yet noticed; such as delay in reply to a letter, or in executing a commission: in these cases, a reason should be given for the delay, or the neglect candidly confessed, and indulgence solicited. If the apology appear forced, or made unwillingly, it cannot be effective. Frankness, in all ordinary cases, will ensure forgiveness.

It is wrong to imagine, that in a familiar or playful correspondence, or letters of intelligence, the slip-shod muse is to be paramount. False grammar, in good society, is not tolerated, even *en famille;* neither can it be in a letter. In the most familiar

epistle, we should recollect what we owe to our language, to our correspondent, and to ourselves. We ought not to write anything of which we may hereafter feel ashamed. Slovenly letters are often, by accident or design, preserved, to rise up in judgment against us hereafter. For the benefit of the young and very lively, it may, perhaps, be well to observe that even in the most familiar letters, pertness and flippancy are, to persons of good sense, neither agreeable nor amusing.

In a letter of intelligence, whenever the nature of the news communicated will permit, cull with taste, and relate without preamble. State nothing but what is true; avoid mere scandal, and reject whatever is merely dubious—or, at least, state it to be so. If you have, by mistake, communicated any false intelligence, be the first to correct it: it is graceful to retrace one's steps, when led astray. Select such facts as you know will be most interesting to your correspondent, and relate them, if of a pleasant nature, gaily, but without malice; if serious, adopt a style suitable to the circumstances.

It is clear, that in familiar, as well as in every other department of epistolary correspondence, some writers will exhibit more talent than others. We cannot all expect to merit the compliment which De la Harpe paid to the Marquise de Sevigné. Speaking of a collection of the letters of this lady (of whom it has been said, that she is, in her style, what La Fontaine is in his), La Harpe uses these expressions: "What book can be more precious to us than that which amuses, interests, and instructs us, without demanding any attention on our part? She always feels what she relates: she paints as a spectator, and we fancy we see the pictures she draws."

France has produced several other very celebrated letter-writers besides Sevigné. Dr. Johnson, however, appears to have thought very lightly of their merits. He observes, that "a slight perusal of the innumerable letters, by which the wits of France have signalised their names, will prove, that other nations need not be discouraged from the like attempts by the consciousness of inability. For [thus the critic proceeds], surely, it is not very difficult to aggravate trifling misfortunes—to magnify familiar incidents—repeat adulatory professions—accumulate servile hyperboles, and produce all that can be found in the despicable remains of Voiture and Scarron."

Although the learned critic may, in the opinion of many persons, be rather too severe in this passage, it appears tolerably clear, that the best models of the epistolary style, are not, as some writers would have us believe, to be found among the French. However, celebrated Montesquieu, Balzac, Voiture, De Stael,

Sevigné, Grimm, and others of that nation, may have been, their epistolary productions cannot surely be deemed of greater beauty (to say nothing of those of Cicero and Pliny) than the letters of such distinguished writers of our own country as Chesterfield, Lady Russell, Lady Mary Wortley Montague, Howell, Pope, Wycherley, Bishop Hoadley, Walpole, &c.

Two letters, which have acquired more celebrity than any others ever written by women of our nation, are the epistle of Anne Boleyn to Henry the Eighth, shortly before her execution, and that of Lady Russell to Charles the Second, a few days after her husband was beheaded.

It is a matter of surprise, that any tolerably educated person, should fall into so gross an error, as to use the first person at the conclusion of a note which has been commenced in the third, and yet this is sometimes the case. For example: "Miss Walters presents her compliments to Mr. Travers, and begs to be informed at what hour Mr. Travers intends to start for Bath to-morrow, as I particularly wish to see him before his departure, and remain, sir, yours sincerely, &c." Such negligence and inelegance should be carefully avoided.

Notes written in the third person, are frequently rendered ambiguous, and sometimes quite unintelligible, by a confusion of the personal pronouns; which, unless the sentences be carefully constructed, seem to apply equally well to the writer and the receiver. There is a French anecdote related, of rather a ludicrous mistake arising from the ambiguity of a letter written, by one friend to another, in the third person. Monsieur A. addressed Monsieur B., who dwelt at some distance from the town where Monsieur A. resided, in these terms: "Monsieur A. presents his compliments to his friend, Monsieur B., and has the satisfaction of informing him, that he has just been appointed, by Government, to the lucrative and honorable post of, &c. [naming the office] in his native town." On receipt of this letter, B. posted, with all possible speed, to throw himself at the feet of A. and, with the warmest expressions of gratitude, thanked his supposed benefactor. A. was amazed, and earnestly inquired the cause of B.'s raptures. "How!" exclaimed B., "Have I not sufficient reason to be grateful? Have you not obtained for me the important post of so and so?"—"Not at all, my dear friend," replied A. "It is I who have been appointed to the office; and I wrote to acquaint you of the circumstance, thinking you would be happy to hear of your old companion's excellent fortune." B. perused the note again, and discovered that, like one of the ancient oracles, it contained two meanings which were directly opposite to each other.

Notes written in the third person, are frequently used, on ordi-

nary occasions, between equals in age or rank, to make a reply to any request; to convey civil inquiries, or compliments, &c. For these, and similar purposes, this form is elegant and unexceptionable. It is, also, generally adopted by superiors, when addressing inferiors on subjects of little importance; but it is improper when an inferior addresses a superior, or when the subject is serious or important. It is also too cold, distant, and reserved, for epistolary correspondence between near relations or friends. If an individual be addressed by her equal, whether upon terms of intimacy, or otherwise, in the third person, it is usual to reply in the same form; but if—in answer to a letter which is commenced and concluded with the endearing epithets used by parties who entertain a friendship for each other; or the respectful terms and expressions of regard, sanctioned by custom, between acquaintance, or personal strangers—the third person be adopted, it is equal, in the strongest cases, to an insult; in others it is accepted as a hint, that the writer is offended, or wishes to close the correspondence; and, under other circumstances, it amounts to a slight degree of incivility. A parade of formal and respectful phrases, in a reply to a letter, in which familiar or affectionate terms are used, is tantamount to a very strong intimation, that the writer declines, or is averse from, being so addressed. D'Alembert said of a certain individual, "He attempts to be familiar, but I repulse him with respect."

Every letter, that is not insulting, merits a reply, if it be required or necessary. All the preceding observations, with regard to rank, age, &c., are, of course, applicable to replies. If the letter contained a request, accede to it gracefully, and without ostentation, or refuse without harshness. An answer to a letter of condolence, or congratulation, should be grateful. The subjects should succeed each other in proper order; and the questions put be consecutively answered. In familiar correspondence, a greater latitude of arrangement is allowed; but even in this, no question should be left unanswered. In all replies, it is usual to acknowledge the receipt, and to mention the date, of the last letter received: this should be an invariable rule; by neglecting it, your correspondent may be left in doubt; or very properly deem you guilty of offensive inattention.

It is a bad practice to suffer letters to remain long unanswered: irregularity, in this particular, is a mark of the greatest disrespect to a correspondent; it is a fault which ought to be sturdily attacked and overcome. "There is, in many people," says an eminent lady, "particularly in youth, a strange aversion to regularity; a desire to delay what ought to be done immediately, in order to do something else, which might as well be done afterward. Be

assured, it is of more consequence to you than you can conceive to get the better of this idle, procrastinating spirit, and to acquire habits of constancy and steadiness, even in the most trifling matters: without them there can be no regularity or constancy of action or character; no dependence on your best intentions, which a sudden humour may tempt you to lay aside for a time, and which a thousand unforeseen accidents will afterward render it more and more difficult to execute: no one can say what important consequences may follow a trivial neglect of this kind. For example: I have known one of these procrastinators disoblige, and gradually lose, very valuable friends, by delaying to write to them so long, that having no good excuse to offer, she could not get courage enough to write at all; and dropped their correspondence entirely."

It is almost needless to say, that in epistolary, as well as in every other style of composition, the rules of grammar should be strictly observed. As to orthography, it will be sufficient, perhaps, to repeat what has been said on the subject by more than one talented writer: among persons moving in good society, and who may be supposed to have received a tolerable education, although to spell correctly be no merit, to spell incorrectly is a great disgrace.

A parenthesis is objectionable, if it break the sense and distort the sentence. It is rare that the subject of a parenthesis may not be better contained in a previous or following paragraph, or an elongation of the sentence, than thrown abruptly into the body of it. As a proof of the obscurity in sense, which may be produced by an injudicious use of the parenthesis, we quote the following lines from a translation of a celebrated Latin author's epistles:

> But Heaven, indulgent to my chaste desire,
> Has wrapped (my husband safe) proud Troy in fire.

In the same work we also find a passage, where two or three sentences, containing facts of importance, are all parenthetically packed into a third, so awkwardly, as to puzzle a good reader how to convey, by emphasis, pauses, intonation, or otherwise, the meaning of the author:

> Sunk now is Troy, the curse of Grecian dames,
> (Her king, her all a worthless prize!) in flames.
> O, had by storms (his fleet to Sparta bound)
> The Trojan perish'd in the mad profound!

Comparisons are sometimes very felicitous; but they must be made with care: their merit consists in the unity of their terms; if they do not agree perfectly with each other, the comparison,

instead of being powerful, becomes ridiculous. A metaphor may also be used with advantage, if it occur naturally; and an anecdote may be as happily applied in a letter as in familiar conversation. Allusions are elegant, when introduced with ease and they are well understood by those to whom they are addressed. An allusion may be made to some pictorial, poetical. or mythological relation; to an anecdote of society; to an adventure of some well-known hero of romance; or, indeed, to any subject of notoriety. The antithesis renders a passage piquant; but those who use it too frequently are apt to become enigmatical. Proverbs and jeux-de-mots are somewhat inelegant; and the latter should be admitted but sparingly. Occasional jeux-de-mots, in a lively letter, if they be ingenious, and, at the same time, produced apparently without effort, season the style; but if they occur frequently, or are only mediocre, they tend to debase it. Such as tell exceedingly well in society, make but poor figures when reduced to writing. If, in epistolary correspondence, a writer permit herself to play upon words, she must do so ingeniously, or her reader will laugh at her, instead of at her point. When occupied on a serious subject, such a practice is most reprehensible; it is tolerated only when addressing an equal and an acquaintance: to a stranger, or a superior, it would be insulting; to an inferior, too familiar. Some very high authorities reprehend the use of this small artillery of wit—if it may be dignified with such a title—either in conversation, or otherwise, as being in bad taste: generally speaking therefore, we may venture to say, that they are better avoided in letter-writing.

The usual contractions in the English language are permitted in letters between friends, relations and equals. They are unobjectionable, also, in letters on business; but held disrespectful, even by those who are not exceedingly rigid, when used by an inferior addressing a superior. All arbitrary contractions, in every case, are in bad taste; nothing can be more inelegant than to press a multitude of abbreviations into any letter.

Punctuation.—Punctuation is a matter of the utmost importance in every species of literary composition: it has been properly termed the very marshalling and arranging of the words of a language; without it, there can be no clearness, strength, or accuracy. Its utility consists in separating the different portions of what is written, in such a manner, that the subjects may be properly classed and subdivided, so as to convey the precise meaning of the writer to the reader; to show the relation which the various parts bear to each other; to unite such as ought to be connected, and keep apart such as have no mutual dependence. It is a circumstance very much to be lamented, that so little attention is

paid to punctuation. A late writer on this subject very truly states, that manuscripts are in general so notoriously defective, that not a little of the obscurity resulting, in many instances, from anything written, is to be attributed to the perfect confusion that exists in the disposition of the words. Many persons never make use of any stops at all, thus leaving the task of discovering where their sentences begin and end to the ingenuity of their correspondents; others use only the full point, thus huddling the minor, and frequently important, divisions of a period, one upon another, in most perplexing disorder; a third class of writers press all the points into their service, but place them in such improper positions, that they produce that identical sort of confusion which they are intended to prevent. The same words, by means of different modes of punctuation, may be made to express two meanings exactly opposite to each other; an ambiguous passage may frequently be rendered clear by a comma; and the sense of an unintelligible sentence be made manifest by the simple remedy of a couple of colons judiciously applied. The object of writing is, most certainly, to express the meaning of the writer to the reader; punctuation was invented for the purpose of giving to written language a precision and certainty which words alone could not convey; we should therefore endeavour, not only to write correctly, but to point what we write with some degree of precision. It should be remembered, that points are the only means we possess of conveying by writing the various pauses, intonations, emphases, &c., which we adopt in discourse: without their aid, we may become ludicrous where we intend to be impressive; exclamatory, where it is our intention to inquire; and subject to being misunderstood in every line which we commit to paper. Were many letters to be read aloud, precisely as they are written, they would sound like a mere "farrago of nonsense;" and could their writers hear them so read, they would, in all probability, be induced to apply themselves to the study of a proper mode of punctuation; but, unfortunately for themselves writers very seldom hear their own letters read; and they, very foolishly, fancy that everybody will, instinctively, read their compositions, with the intonations, emphasis, and tone, they themselves desire. The contrary is almost invariably the case. It is impossible for us, on all occasions, to convey our ideas with precision by means of written language; but we may advance far towards it by judicious punctuation. As there is no positive system of punctuation to direct the writer, the modern editions of good authors should be carefully studied, in order to acquire the leading principles of the science. The construction of sentences may be examined, and the mode adopted of dividing them, attended to with considerable advantage

It is a good plan, for improvement in pointing, to copy a page of some standard work, without capitals or points; and, after it has been laid aside for a few days, to endeavour to write it again with the proper points; by a subsequent comparison with the original, the writer may discover her errors, and guard against similar blunders in her future exercises. It is not to be expected that she will attain, by these, or any other means, the power of pointing a page in complete accordance with a printed work; but she will, no doubt, acquire a degree of knowledge and experience in punctuation which cannot fail to be of considerable utility to her in her future epistolary productions.

In order to show the necessity of not merely using points, but punctuating properly, the following passage from a work on this subject, in which it is given as a study, but without any key, is submitted to the reader:

"The persons inside the coach were Mr. Miller a clergyman his son a lawyer Mr. Angelo a foreigner his lady and a little child."

As this passage stands, without points, it is unintelligible: by different modes of punctuating it, several alterations may be made in its sense; not only as to the number of persons in the coach, but, also, as to their country, professions, and relationship to each other. By a change of points, the lady may be described as the husband of either one or two persons; Mr. Miller's son may be made a clergyman, or a lawyer, at will; or his son may be taken from him and given to a clergyman, whose name is not mentioned. We shall give three or four different modes of punctuating this passage. The reader may, if she think fit, amuse, and, at the same time, convince herself of the propriety of attending to the proper use of stops, by a number of variations; each of them correct in itself, and, at the same time, endowing the words with a different signification:

"The persons inside the coach were Mr. Miller, a clergyman, his son, a lawyer, Mr. Angelo, a foreigner, his lady, and a little child."

By this mode of pointing, it would appear that there were eight individuals in the coach: namely—a clergyman, a lawyer, a foreigner and his lady, a little child, Mr. Miller, Mr. Angelo, and the clergyman's son.

"The persons inside the coach were Mr. Miller, a clergyman; his son, a lawyer; Mr. Angelo, a foreigner; his lady; and a little child."

This change in the punctuation would reduce the parties in the coach, exclusive of the lady and child, to three persons; and make Mr. Miller himself a clergyman, Mr. Miller's son a lawyer, and Mr. Angelo a foreigner.

"The persons inside the coach were Mr. Miller; a clergyman, his son; a lawyer, Mr. Angelo; a foreigner, his lady, and a little child."

Here Mr. Miller's son becomes a clergyman, Mr. Angelo a lawyer, and the lady and child those of a foreigner, who is nameless.

"The persons inside the coach were Mr. Miller; a clergyman, his son; a lawyer; Mr. Angelo; a foreigner, his lady; and a little child."

Mr. Angelo here ceases to be a lawyer; there is no longer a foreigner who is the husband of the lady and the father of the child; but the lady is described as being a foreigner, and Mr. Angelo's wife; and the child is not understood as being akin to any person in the coach.

These are only a few of the alterations that may be effected in the sense of this sentence by means of punctuation. It would be needless to multiply them further; sufficient has, doubtless, been done, to show the necessity of pointing a passage so as to accord with the fact it is intended to relate.

It is very improper to omit dating a letter. The address of the person who writes it should be put above, or, if it be short, on the same line with the day of the month and the year; and such addresses, as well as the signature, should be written in a plain, intelligible hand. Instances have occurred, of letters remaining unanswered through the culpable negligence, or carelessness, in these particulars, of the parties sending them. It is, in many cases, as bad to write the address in an illegible scrawl, or sign the name in a fantastic and affected style, as to omit them altogether. The consequences of an address being either omitted, or written incorrectly, or in characters which cannot be deciphered, in a letter from a person who is either travelling from place to place, or whose abode is not previously known by the person to whom the letter is addressed, may prove very unpleasant to the parties. The same observation is applicable to a fanciful signature: it is quite a tax upon the patience and good temper of an individual, who is addressed by a stranger, or an acquaintance, perhaps, for the first time, to conclude with what is to all intents and purposes a mere unintelligible hieroglyphic.

The date of a letter is sometimes written beneath the signature; and, by some persons, on the left side of the bottom of the paper: in the former situation it has an inelegant appearance; and in the latter it usurps the place of the name of the person to whom the letter is addressed. The most usual and proper situation of the address of the party writing, with the date beneath it, is on the

upper part, and on the right side of the paper, midway between the first line of the letter and the upper edge. Notes written in the third person are, occasionally, dated in the same manner; but in these, the most approved manner is to place the address and date on the right side, a little below the last line of the note.

Both letters and notes in the third person should be addressed to the party for whom they are intended, on the left side of the lower part of the paper; the place of abode it is unnecessary to add. The letter, or note, should never be finished so near the bottom as not to leave sufficient room for the usual conclusion and signature. It is better to carry over a line or two to the next side, than to squeeze the signature of the writer, and the name of the party addressed, down to the paper's edge, even if a little more than the usual blank be left beneath the last line of the first side. The signature should always be written towards the right edge of the page. The language adopted at the conclusion of letters varies according to the rank, age, and other circumstances of the writer and the person addressed. It is a point with many, so to construct the last sentence of the letter, that the "words of course," previous to the signature, may form its conclusion. It is disrespectful to be too concise in this part of a letter, especially when addressing a superior. The forms ascend, by various grades, from the plain "I am, Sir, Your humble servant," up to and even beyond "I have the honour to be, My Lord, With great respect, Your Lordship's most obedient, And very humble servant," &c. It is usual to display the conclusion in two, three, or more lines, according to the terms used by the writer.

Our sex has been accused, probably with some reason, of reserving the most important part of a letter for the postscript; let us endeavour to avoid giving cause for being thus reproached. Postscripts are, for the most part needless and in bad taste. Allow me, therefore, to advise my young friends to pause a few moments before they conclude a letter, and reflect whether they have anything more to say. Above all things, let them not defer their civilities, or kind inquiries for any friend or acquaintance, to this justly-despised part of a letter. To do so is a proof of thoughtlessness or disrespect. "My kindest regards to my cousin Jane," with a P.S. before it, looks like what it really is,—an after-thought; and is therefore not only without value, but, to persons of fine feelings, offensive. There is an affectation, also, in setting the jewel of the whole epistle in the postscript, which is certainly unworthy of being either approved or imitated: this fault is as often committed by gentlemen as ladies. An instance occurs to me, in which it was grossly palpable. An officer, some years ago, wrote

a very long letter to one of his female friends, detailing not only the particulars of a battle in which his regiment had been engaged, but also information of a diversified nature, both as to his own pursuits and petty privations, as well as concerning the country through which he had recently marched. He concluded by kindly mentioning, and desiring intelligence of, all his friends; and did not forget to inquire "how the chesnut colt got on." After all this, in a postscript of a line and a half, he stated that in the engagement his leg was shattered, and had afterwards been amputated; but that he was "pretty well, considering." By some persons this letter has been admired; to me it appears to be a splendid specimen of ridiculous affectation.

To all fantastic signatures I have already declared my enmity, and I now add my protest against all fantastic modes of folding letters or notes. I have some reason to flatter myself that I am warranted in directing my feeble anathema against both, by good taste and the opinions of those whom I respect for their experience and admire for their discrimination. It used to be an object with some ladies, especially young ladies, to fold their notes in such a manner, that it was as difficult to open them as Alexander found it to unravel the Gordian knot. I will venture to assure my readers that it is no proof of ingenuity, or talent, to be able to fold a piece of paper three inches square in thirty triangles, or to render it as difficult to be opened as a conjuror's box. The simple modes of folding letters and notes are, beyond all comparison, the best and most polite. But since the remission in the Post-office regulations, envelopes have become so universal, that few will now choose to adopt any other mode.

It is good taste to enclose every letter in an envelope, and nothing should be written on the inside of it; neither ought the enclosure to be superscribed with any address. An entire sheet is generally devoted to the enclosure, but it is not unusual for it to consist of only half a sheet of paper, with both sides written on, which in polite life, at least, is objectionable; it should be an entire sheet.

Some attention should be paid to the superscription of a letter: which should be neither too high nor too low, but rather approaching the lower than the upper edge. It is usual to commence it near the left side of the paper, and to make the beginning of each succeeding line nearer the right edge. A proper division of the address must be made: the street should not be placed in the same line as the *quartier*; nor the latter, as the town, or city; nor the town, or city, as the kingdom—when it is necessary that these, or any of them, should be mentioned. The word England is

almost unnecessary, when the letter is addressed from abroad to London, or any principal city in this country; but surplusage, in this case, being no offence, it is quite as well to add it.

Having thus traced the letter from its commencement to its superscription, it is incumbent that something should be said as to the mode of sealing. In "olden times," letters were secured by the fair maidens, their writers, with threads of silk, and, occasionally, even with braids of their hair; but at the present day the most elegant mode of closing them is with wax. Wafers are seldom used but by men of business. Adhesive envelopes, however, have of late become so prevalent, that we must bow to the new custom, and be content to use wax only on special occasions.

The process of sealing a letter should be performed in a few minutes, but it will take me some time to describe.

There are few persons who have not been pleased with the beauty and rich effect of the impressions taken by engravers, and wondered how they were effected. The reader may produce specimens that may almost rival these by a little practice, and attention to the following instructions.

In the first place, it is highly essential that good wax should be procured. Fancy wax, it may be observed, is not so well adapted to display the beauty of the engraving as that of a brilliant red colour.

The light for melting should not be tallow, but a wax taper, which should be so placed as not to be affected by any draughts of air. The wax should just touch the tip of the flame without breaking it; if it be depressed a hair's breadth too much, the flame will divide, rise up on each side of the wax, envelope it in smoke, and cover it with black blotches, than which nothing is more detrimental to the beauty of an impression. It is a common custom to thrust the wax into the flame of the candle, and the moment a morsel of it is melted, to daub it on the paper; then to melt another and another portion, and, when an unsightly and shapeless mass is gathered together, to pass the seal over the tongue—dab it upon the wax with unnecessary haste—press it with great force—and the result is, a wretched impression. The wax should not be removed to the paper until a sufficient quantity is melted for the reception of the seal; which, instead of being wetted with the tongue, should, just before its being placed on the wax, be warmed over the flame. The seal requires heat to clear it of the least dampness, which is highly detrimental to the perfect junction of the wax with the finer parts of the engraving.

In melting the wax, the elbow, for the sake of extreme steadi-

ness, should rest on the table, or Escritoire; as soon as the flame begins to melt it, the stick is to be turned till it holds sufficient wax for the seal. If you are careful, the melted wax will be so well turned round the point of the stick, that no drops, or, as they are currently called, kisses, will fall on the letter in the passage of the wax to the seal. Stir the melted wax gently half-a-dozen times round with the end of the stick, so as to distribute it equally and obliterate the blacks, if you have made any, decreasing your circle by degrees, until you end in the centre of the proposed seal; here lift the stick. Round wax is much better for procuring good impressions than flat.

If you have melted the wax properly, there is no occasion to be in extreme haste to place the seal upon it; in fact, if the seal be applied while the wax is too liquid, you will produce a deep frame and no picture. At the same time it is necessary to caution you not to be dilatory: sealing a letter should be done without hurry, and without delay. A very small bit of wax may be dropped beneath the turn-over of the letter; and the wax intended for the impression should be melted exactly upon it.

Should either of our readers feel inclined to produce an extraordinarily fine impression, she may lay vermilion on her seal, after the manner of the engravers. The common colour is unfit for the purpose; Chinese vermilion only should be used, which is to be procured at two shillings the ounce packet. A jeweller's soft polishing-brush, and a camel's-hair brush of a tolerably large size, will be found necessary for the preparation of the seal, and the application of the vermilion; a bit of fine pomatum, about the size of a pin's head, is to be rubbed over the whole surface of the polishing-brush, and this will suffice for twenty or thirty impressions. When the seal is warmed, the polishing-brush is passed across it three or four times; the camel's-hair brush is then dipped in the vermilion, and lightly and equally applied to the face of the seal, so as to leave a thin mask of the powder over every part of it. The loose vermilion must then be blown off, otherwise it will be apt to lodge in the hollows, and prevent the wax from entering the finer lines. The wax is to be melted, and the seal applied as before described. The impression will be so superior, as to compensate for the trifling additional trouble taken to produce it. Instead of having a gloss all over the surface, and being of one colour only, the interior part, which the seal has touched, will be of a rich dead vermilion; the frame, or raised border, outside it, retaining the natural brilliancy of the wax.

For ordinary correspondence, ladies generally employ the plain post paper. Fine white and tinted satin writing papers, of very

delicate colours, with and without embossed borders, are considered more elegant for letters of congratulation, accompanying a present, &c. For notes or billets, the small-tinted or embossed note-papers, of various sizes, are almost universally adopted; and it is now become very general to enclose them in delicate white or tinted envelopes, sometimes embossed round the margins, but more frequently plain white. These envelopes may be purchased, at the fancy stationers', of all the sizes requisite for folded letters, notes, or billets. Mourning papers, of different degrees of depth, according to the occasion which requires their use, are adopted for all kinds of correspondence.

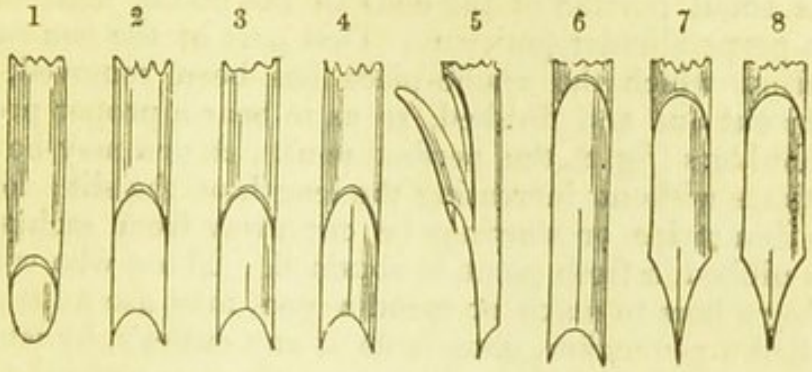
The best ink is that which flows freely from the pen, and has a pale appearance when written with, but dries a fine black colour. A small quantity only should be poured into the inkstand, and the bottle, in which the residue is kept, should be well corked. The glass should have a cover, so that the dust may be prevented from falling into the ink, and it should occasionally be cleaned out. Neither sponge nor cotton should be put in it; they are objectionable, because they damage the fine point of the pen when it is squeezed against them in order to make the ink flow.

Various kinds of pens have been invented of late years; but whatever may be the merit of the greater part of them, for the use of a lady who is seldom employed at her escritoire, except to write a few short notes, and occasionally two or three letters, none of them are superior to the pen made from the gray-goose quill. The silver and steel, and even the gold pens, do not suit every hand; but many give them the preference, and they undoubtedly have become very prevalent. Boxes of quills cut from the feather, and also points only, are to be obtained at the stationers': these are convenient, because they are more portable than pens in bundles.

The complaint of having wretched pens, ink, and paper, as an excuse for careless or unintelligible writing, is a plea that ought never to be accepted from a young lady; for, as every one must be aware, she can but rarely, if ever, in the ordinary course of events, be placed in situations where she cannot obtain paper and ink of proper quality; quills are also easily obtained, and she ought to be able to make or mend a pen herself. If she have not already acquired the mode of performing this very useful operation, the following directions will, perhaps, be of considerable assistance to her in making the attempt. It is, of course, necessary that the escritoire should be furnished with a good penknife.

The handle of the knife should be held low in the hand, so that a full command may be obtained of about half an inch of the top

of the blade, which is sufficient to operate with in shaping the pen. A quarter of an inch is to be first cut off the back of the quill



(fig. 1), and about twice as much in front (fig. 2); a short slit is then to be made, as nearly as possible in the centre of the back of the quill (fig. 3); the slit is to be increased (fig. 4)—not in the ordinary way of filliping it with the thumb nail, which frequently makes it ragged, irregular, or too long—but by using the end of the handle of the knife, if a proper desk knife, or in default of that, another quill, so as to act as a lever against it. To prevent the slit being carried too far, the left thumb should be pressed firmly on the back of the quill. The knife is now to be applied to the front part again, and what is called the cradle-piece (figs. 5 and 6) cut away; a point is then to be obtained, by cutting gradually from the sides of the quill towards the end; this is technically termed sloping the shoulders, and is varied according to the maker's style of writing. For a free running-hand, such as is usually adopted by ladies, the shoulders should be considerably sloped, as fig. 7; which shows the pen with the cradle-piece removed, the shoulder properly sloped, and the point ready to be nibbed. When the pen is in this state, it is proper to ascertain, by looking at its back as well as front, that an equal quantity has been removed from each side, that the slit is neither too long, nor that too much of it has been cut away: in the former case, the pen will be either too soft, or splutter; in the latter, it will be too hard, except it be for such as bear heavily on the paper when writing. The slit, if too long, may of course be easily decreased by cutting more away from the sides; if it be too hard, the slit may be increased in the manner directed for making it. The points are to be lightly closed, and the back of the pen, from the shoulders downward, gently rounded by a trifling pressure of the ball of the left thumb. The pen-nibber, or the end of another

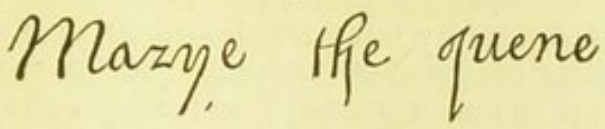
quill, is now to be inserted in the barrel of the pen, and with the knife held sloping, its edge being forward, a fine piece is to be cut from the top of the points; the pen is then to be cross-nibbed, by cutting a small portion of the ends of the points with the knife held in a perpendicular position. That part of the pen called the scoop, from which the cradle-piece has been removed, should, finally, be cut out and finished, so as to bear a proper proportion to the shoulders (fig. 8, the perfect pen). A pen may be mended several times without increasing the length of the slit; for if two or three thin strips or shavings be cut away from each side, and the ends nibbed, a fresh point is obtained. Those who will not or cannot learn how to make or mend a pen, may use a little instrument called a pen-maker, obtainable at any cutler's, by which pens are made or mended with very little experience or manual dexterity.

The systems of teaching ladies to write a neat, regular, running hand, which have been generally adopted for some years past, destroy that individuality which was formerly admired; all those who have been taught by the same master forming their letters so much in the same style, that it is almost impossible to discover any difference in their writing; but whatever may be the objections made to modern methods of tuition, by those who have founded a system on Cowley's expression—"I want to see Mrs. Jago's hand-writing, in order that I may know her temper"—it appears to me, that much benefit has been produced by the inventors and professors of the new modes of forming the handwriting; for the letters of almost every lady are now neat, elegant, and legible; whereas, although a few of the ladies of past times wrote beautifully, the greater number of them perpetrated scarcely intelligible scrawls. Among celebrated ladies who have been remarkable for elegant penmanship may be enumerated Lady Jane Grey and Anna Maria Schurmann. The destruction of individual character, by the adoption of one general type or form in manuscript, is really but a trifling loss; for any peculiarity in the characters, indicative of the mind, temper, or situation in life of the writer, could but rarely occur. Irritable persons frequently write with great neatness and precision, while many of an opposite temperament scribble in the most hurried, and apparently nervous, manner imaginable. The signatures of several who have been remarkable for their firmness, are weak and vacillating; and those of others, who were possessed of but a moderate portion of resolution, appear firm and decided.

The reader may very properly judge for herself, as to the significancy of handwriting, by referring to the fac-similes of the signatures of three queens, with whose characters, I trust, my

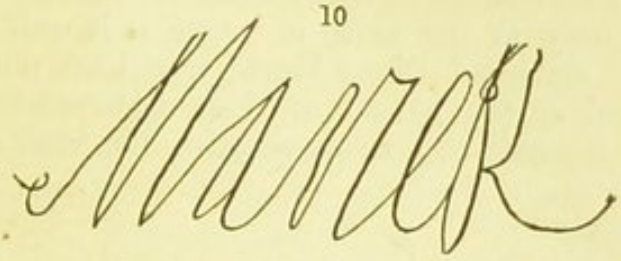
young friends are sufficiently versed in English history to be acquainted. (See figs. 9, 10, and 11.)

9



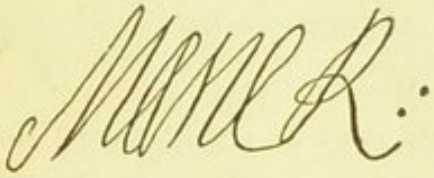
Daughter of Henry VIII.

10



Henrietta Maria, Queen of Charles I.

11



Queen Mary, Consort of William III.

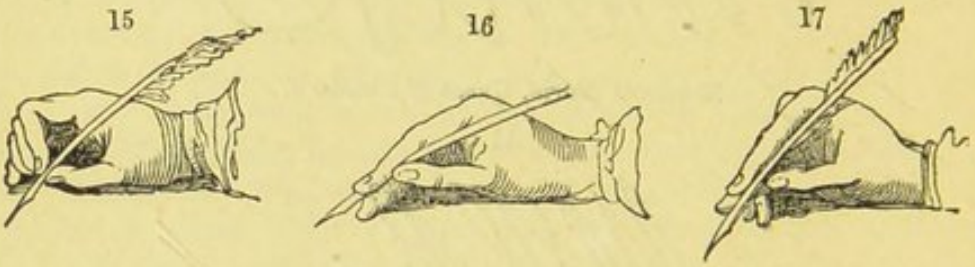
Before concluding my remarks, I feel bound to warn my young readers against suffering themselves to fall into bad positions when writing; they are not merely ungraceful, but are calculated to produce a permanent contortion.

12 13 14

The injurious effect produced upon the figure by leaning in the manner indicated by fig. 12 must be evident to any one who will compare the position of fig. 12 with that of fig. 14, or even fig. 13. Mr. Shaw, a gentleman who has written very learnedly upon this subject, recommends, in cases where the body has a decided inclination to the left when writing, to equalise the shoulders by

placing a book under the left elbow; and if this should not be found sufficient, to balance a book on the head.

The manner of holding the pen is another subject that merits consideration. Although, perhaps, mal-position, in this respect, is not likely to produce any ultimate deformity, unless the hand be more than usually occupied in writing; yet, as the best mode of holding the pen is the most graceful, and affords the writer greater facility of execution than any other, that mode should be adopted. A glance at the above sketches will, doubtless, convince the reader, that, if it were only on the score of grace, it is well to hold the pen in a proper manner. Many ladies, who have not been sufficiently instructed at the period of their commencing to write, when the hand is small and weak, acquire the crabbed and un-



graceful mode of holding the pen designated by fig. 15; others, either from the same cause, or through inattention, after they have been emancipated from the thraldom of the writing-master, place the pen between the fore and middle finger, as represented by fig. 16. The proper mode is intended to be shown by fig. 17, where three fingers hold the pen, while the other two support them. The exact position, however, can be much better acquired by the instructions of an intelligent writing-master than from any engraved or printed instructions.

F. P. Stephanoff.

L. Stocks.

Her Majesty

ARCHERY.

Oh, bold Robin Hood
Was a forester good,
As ever drew bow in the merry green wood;
And what eye hath e'er seen
Such a sweet maiden-queen
As Marian, the pride of the forester's green?

RCHERY was formerly one of the chief pastimes, and the greatest defence, of the people of England against their enemies. Many statutes were made for its encouragement; and even after the bow was superseded by other arms as a warlike weapon, the people were enjoined by parliament not only to keep bows and arrows, but also to practise shooting at the target; the City of London was compelled by the legislature to erect butts for this purpose. We have not met with any well-authenticated record of the first introduction of the long-bow to this country; but there is sufficient evidence to be found in the works of the old historians, to show that it was in use as a weapon for forest and field in very early times. Richard the First was killed by an arrow, in the year 1199. In the reign of Edward the Third, precepts were issued to the sheriffs, commanding them severally to provide a certain number of bows and bundles of arrows for the then intended war against France; and in the battle of Cressy, which

was fought shortly after, the English had a body of two thousand archers, to whose exertions the victory has, by some writers, been mainly attributed. The same king also directed the sheriffs of shires to see that the people exercised themselves with bows and arrows, instead of such unprofitable games as foot-ball, &c. In the time of Edward the Fourth, every Englishman was compelled to keep a bow; and butts were ordered to be set up in every township, at which the people were directed to shoot, on feast days, under a certain penalty. Sir Christopher Morris, Master of the Ordnance to Henry the Eighth, by command of the king, established a society of archers, for the express purpose of encouraging the use of the bow; and in Edward the Sixth's time, a sermon was preached before the king in favour of the sport, as an admirable exercise, by the famous Bishop Latimer. That monarch also records in his journal, that a hundred archers of his guard shot before him at an inch board of well-seasoned timber, which was completely pierced through with the heads of some of the arrows. An act of Henry the Eighth, by which every man was compelled to have a bow and three arrows, not being generally complied with, in the reign of Elizabeth, the bowyers petitioned that queen for authority to put them in force; during her reign, also, the price of bows was expressly regulated by statute. The London Archers (for whose use several gardens had been levelled, in 1498) petitioned James the First to put a stop to the encroachments made upon their grounds by the inhabitants of the outskirts; and a commission was directed to several persons of eminence, to inquire into the circumstances, and restore the archery field to its former state. On a former occasion (in 1514) the people of Hoxton, and neighbouring villages, having committed a similar trespass, the citizens of London took the law into their own hands, and, assembling in great numbers, with spades and pick-axes, proceeded at once to remove all the obnoxious enclosures and ditches. Charles the Second was not only an archer himself, but so much disposed to encourage the sport, that he knighted a man for excelling Sir William Wood, a celebrated archer, at shooting with the long-bow. From the death of Charles, archery gradually declined, until towards the close of the last century, when it was revived in various parts of England. A number of societies have, since that time, been established, and this excellent pastime has now, for some years past, been patronised and practised by ladies of the first rank. Meetings of archers, of both sexes, occur frequently in the course of every season: they are attended by many of the female nobility, and form, perhaps, the most brilliant and attractive rural fêtes which are enjoyed throughout the year.

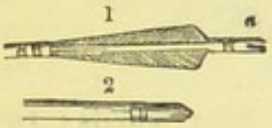
Ladies usually shoot at a distance of about fifty yards; two targets are placed opposite each other, and the archers shoot from one to the other; that is, when all the party have shot at one target, they walk up to it, gather their arrows, and shoot back to the one they came from, to which they again return when their arrows are expended; and so on, shooting from one to the other in rotation; so that, not merely the arm, but the whole frame, enjoys the benefit of salutary exercise in the open air, while the mind is interested, and the spirits elevated, by the sport. The attitude of an accomplished female archer—of one who has studied and practised the art in a proper manner (for archery is not to be acquired without a little application)—at the moment of bending the bow, is particularly graceful; all the actions and positions tend at once to produce a proper degree of strength in the limbs, and to impart a general elegance to the deportment. For these and other reasons which might be adduced in its favour, Shooting at the Target is scarcely excelled by any recreation, in which propriety permits young ladies to indulge.

BOWS, ARROWS, AND ACCOUTREMENTS.

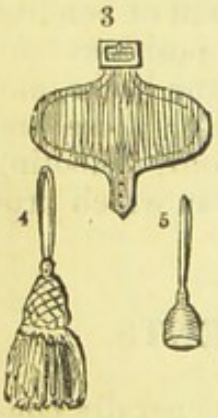
In the selection of a bow, the young archer may generally confide in the manufacturer or dealer from whom it is purchased. The archery warehouses are numerous in London, and for the most part publish priced lists of their stock. By these we see that a lady's equipment varies, according to the quality of the bow and arrows, from about £2 to £5. The most expensive bows in usual

sale are made of foreign yew, which are improved by being backed with hickory. Lancewood ranks next in degree, and by some are even preferred on account of their elegance. But bows are now made of many other woods, and when properly backed with hickory or hornbeam, are found to answer perfectly. The cheapest are what are called *self-bows*, that is, consisting merely of one ordinary wood, not backed. The length of the bow varies from five feet seven inches to six feet, and should be selected in proportion to the height and strength of the archer. The chief point to be attended to is, that it be free from knots, and not so much above her strength as to prevent her using it with sufficient ease.

The weight of the arrow should be proportioned to the power of the bow. They are generally made of ash or red deal, and those which are apt to splinter, varnished, the latter being much the best; the nock (fig. 1, *a*), which ought to be cased with horn, should exactly fit the string: it is to be observed, that of the three feathers with which arrows are furnished, the one which is of a different colour from the other two, or which, if all three be alike in this respect, is placed upon the horn, is denominated the cock feather, and must always be uppermost on the string. A difference of opinion exists among archers, as to whether the arrow should taper from the feathers (fig. 1) to the pile (fig. 2), from the pile to the feathers, or in each direction from the middle. Arrows may be obtained in either of these forms, according to the fancy of the archer.



The Brace, or Arm-guard (fig. 3), is made of stout leather with a smooth surface, and is buckled round the bow arm, not too high, just above the wrist, to prevent the string from hurting it. A Shooting-glove, consisting of three finger-stalls, back-slips, and a cross-strap buttoned round the wrist, is also worn on the right hand, to protect the fingers from being injured by the string. It should fit easily, and be neither too thick nor too thin. The Tassel (fig. 4) is necessary to wipe away any dirt that may adhere to the arrow when drawn from the ground. The Grease-box (fig. 5), generally made of wood, horn, or ivory, contains a composition, with which the brace and the finger-stalls are occasionally anointed, so that the string may more easily quit the latter and glide over the former. Some substitute a lapping of floss silk. The Belt is buckled round the waist; the tassel is hung on the right or left side of it, and the grease-box from its middle. To the belt is also suspended the Pouch, in which two or three



arrows, for present use, are contained. The QUIVER (usually made of tin, with holes for separating the arrows) is not worn in target shooting, it being placed a few yards aside, with other arrows in it to replace those in the pouch, when necessary.

PRACTICAL DIRECTIONS.

THERE is little variety in BOW-STRINGS; the only good ones are of foreign make, and the very best are the produce of one particular maker, a Belgian, in whose family the secret is preserved with great jealousy. The string has a loop or eye at one end; and a noose is made at the other, by which it is fastened to the bow. To carry the eye of the string into the nock at the end of the other limb of the bow, or, technically speaking, to string it, is a matter of some difficulty to the inexperienced. For a bow of five feet long, the distance between the centre of the bow and the string, when the bow is properly strung, should not exceed five inches, and in the same proportion for a greater or lesser length. The bow is always to be bent with the round part inwards; but when unstrung the flat part, or back of the bow, should be inwards: they are manufactured in that manner to increase their power in shooting. In order to string the bow (see fig. 6,) it must be taken, by the right hand, exactly in the centre of the handle: its flat part, or back, should be turned towards the archer, and the right arm rest against the side. The lower end of the bow, which has the shortest horn, is then to be placed on the ground against the inside of the right foot, which should be slightly turned inward, to prevent the end from slipping away, and the left foot be advanced. The centre of the left wrist must then be placed just below the eye of the string, in the upper part, or limb of the bow, with the end of the thumb upon one edge, and one of the knuckles of the fore-finger upon the other; the other three fingers must be stretched out, as they are useless in the operation, and are in danger of getting under the string and being seriously hurt, if the eye of the string be not properly carried into the nock of the bow (fig. 7, *a*, the nock of the bow; *b*, the eye of the string). With the bow in the position above described, the centre of it is to be pulled smartly upwards by the right hand; the upper limb, at the same time, being pressed downward

6

wrist, and the hand carried upward until the eye of the string is received into the nock. When the archer is satisfied that it is correctly placed, and not before, she is to remove her left hand from the bow, which will then be perfectly strung.

The operation of stringing the bow is to be performed calmly and patiently; and it should be practised until it becomes easy of execution. Should the right foot slip, on account of the pressure of the lower limb of the bow, the outside of the foot may be placed against a wall, or some other fixed object; and if the string should get under the thumb or finger of the left hand, they must be pressed more closely against the edges; as it is to be observed, that the eye of the string must be carried up *above* the finger and thumb, and not between them and the edges of the bow.

To UNSTRING THE BOW, the archer places herself in the attitude for stringing it; but the left wrist must be placed so near the top of the upper limb, that the fore-finger may reach round the horn, and its tip be inserted in the eye of the string: in this position, the centre of the bow is pulled upwards with the right hand; its upper limb pressed downward with the left; and, when the string is sufficiently slackened, the eye of the string is removed by the fore-finger.

The bow being strung, its handle is grasped with the left hand, and held, horizontally, with the string upwards, while the arrow is taken, by its middle part, from the pouch, and carried under the string to the left of the bow, until its pile reaches the left hand, the fore-finger of which then receives it, and the right hand is removed from its middle to the nock. The arrow is next to be drawn down the bow, and the string placed in the nock, with the cock feather uppermost, and exactly opposite the centre of the handle: the fore-finger is then removed from the arrow and placed round the bow (fig. 8.) To PULL THE STRING UP, in order to discharge the arrow, the thumb is not used: the string is drawn (and the arrow with it) by two or three fingers only; it should be taken about midway between the tips and first joints, so that when drawn it may be easily and instantly disengaged.

8

The ATTITUDE in shooting is a matter of much importance: the body should be gracefully upright; the heels should be a few inches apart; the neck slightly curved, so as to bring the head a little downward; and the face, but no part of the front of the body, turned towards the mark. The left arm must be held out quite straight to the wrist, which should be bent inwards; the bow is to be grasped firmly, but easily in the hand, the

wrist being turned neither inwards nor outwards; and the arrow, when drawn, should be brought, not towards the eye, but the ear (fig. 9). The right hand should begin to draw the string as the left raises the bow: when the arrow is three parts drawn, the aim is to be taken; in doing this, the pile or arrow-point should appear to the right of the mark; the arrow is then drawn to its head just to that point where the pile commences, and immediately loosened. On account of the handle being placed rather below the centre of the bow, in order to equalise the resistance to the pull, the lower limb is made shorter and stronger than the upper. As the young archer will be in danger of breaking her bow if she draw it with the weak limb downward, she should carefully observe that it is in its proper position. As that part of the string which receives the nock of the arrow is always whipped round with sewing silk, to prevent it from wearing, the archer may be sure that the bow is upside down if there be no silk on the string, where it receives the nock of the arrow when properly placed.

9

Some of the earlier writers on archery recommend that the left arm should be stretched out as straight as possible; some that it should be curved outwards, and some that it should be bent inwards; all of which is contrary to the principles now taught. The natural mode of grasping the bow, without any forced extension or bending, is held to be the best.

As regards AIMING, this must be a matter of practice, but it seems an accepted rule that the archer should keep her eye constantly on the object aimed at. The mark to be hit is not always identical with the point of aim, which may be a little to the right or left, according, as Ascham says, "to the nature of the winds" and other circumstances. Some, under an erroneous conception of vision, are in the habit of shutting one eye when aiming, but a lady will naturally avoid so inelegant a mode. The last of Ascham's five points of archery is

LOOSING, that is, withdrawing the fingers from the string to discharge the arrow,—a part of the science upon which much stress is laid. It is usual to employ three fingers, although some very strong persons employ only two. A good loose consists in quitting the string steadily, and with all three fingers simultaneously, without letting them follow it even a hair's breadth. Extreme sharpness or impetus given to the flight of the arrow is no conclusive evidence of its goodness.

The position—the string should be across the fingers above the first joints, not too near them, nor approaching too closely their ends. A too great grip causes a jerk—an insufficient one deprives the shooter of sufficient command.

To *draw the arrow from the target or ground*, it should be taken by the hand, as near to the pile as possible, and extracted in the direction it entered. If these instructions be not attended to, the young archer will break many arrows in drawing them.

A person at the targets should be furnished with a card, having proper divisions (fig. 10), for the insertion of the archers' names, and to register the hits made by each as they occur. This is usually done with a pin, suspended from the card, as the holes made by it are more proof against accidents than the marks of a pencil; and ink in the archery-ground is very inconvenient.

10

Colours and their relative value.	Gold. 9	Red. 3	Inner White. 2	Black, add a 4th.	Outer White.	*Total.*	*Value.*
Names.							
Miss A.	1	3	7	11	15	37	63
Miss B.	2	6	7	7	15	38	80

The face of the target contains four circles and a gold centre: the inner-circle is red, the next white, the third black, and the outer is white, bordered with green. The mode of ascertaining the value of the hits, which is increased in proportion as they reach the centre, will be seen by the following example:—It appears by the card (fig. 10), that A has one in the gold, three in the red, seven in the inner-white, eleven in the black, and fifteen in the outer-white, making, in the whole, twenty-eight: the real value of these is to be ascertained by multiplying the hits in the gold by nine; in the red, by three; in the inner-white, by two: by adding a fourth to those in the black, and leaving the number without alteration of those in the white: by this process it will appear, that A.'s numbers according to the value of each circle, amount to sixty-three. B.'s total number of hits (fig. 10), are twenty-five only; but calculated in the same manner, they surpass A.'s by seven. At grand meetings there are frequently two prizes contested for: one, the prize for numbers, computed in the manner

we have described; and another for the hit nearest the centre of gold. Different opinions have been entertained, as to hits on the edge of a circle: the best mode, perhaps, is to reckon them as falling in the outer circle.

There are several kinds of practice with the bow besides target-shooting, but they are scarcely available to ladies, unless they have the advantage of large parks. The three principal are the following:

Flight-shooting, which takes its name from the flight or light arrows used for it, consists in sending the arrow to the greatest distance. The bows and arrows should, of course, be of equal power. The game is usually *seven*.

Clout-shooting.—This is practised by those who cannot conveniently set up targets. The *clout* may be a piece of white pasteboard or a piece of cloth stretched on a hoop, about thirty-six inches in circumference, set up on a stick or on straw, against a wall or *butt* of turf. Seven is the game, and all arrows which fall within three bow-lengths count.

Roving consists in aiming at casual and unmeasured marks, a tree or any other object, generally at considerable distances. Arrows which fall within five bow-lengths count, and the nearest one wins. The game is seven.

All these sports are more trying to the bows than regular target-shooting.

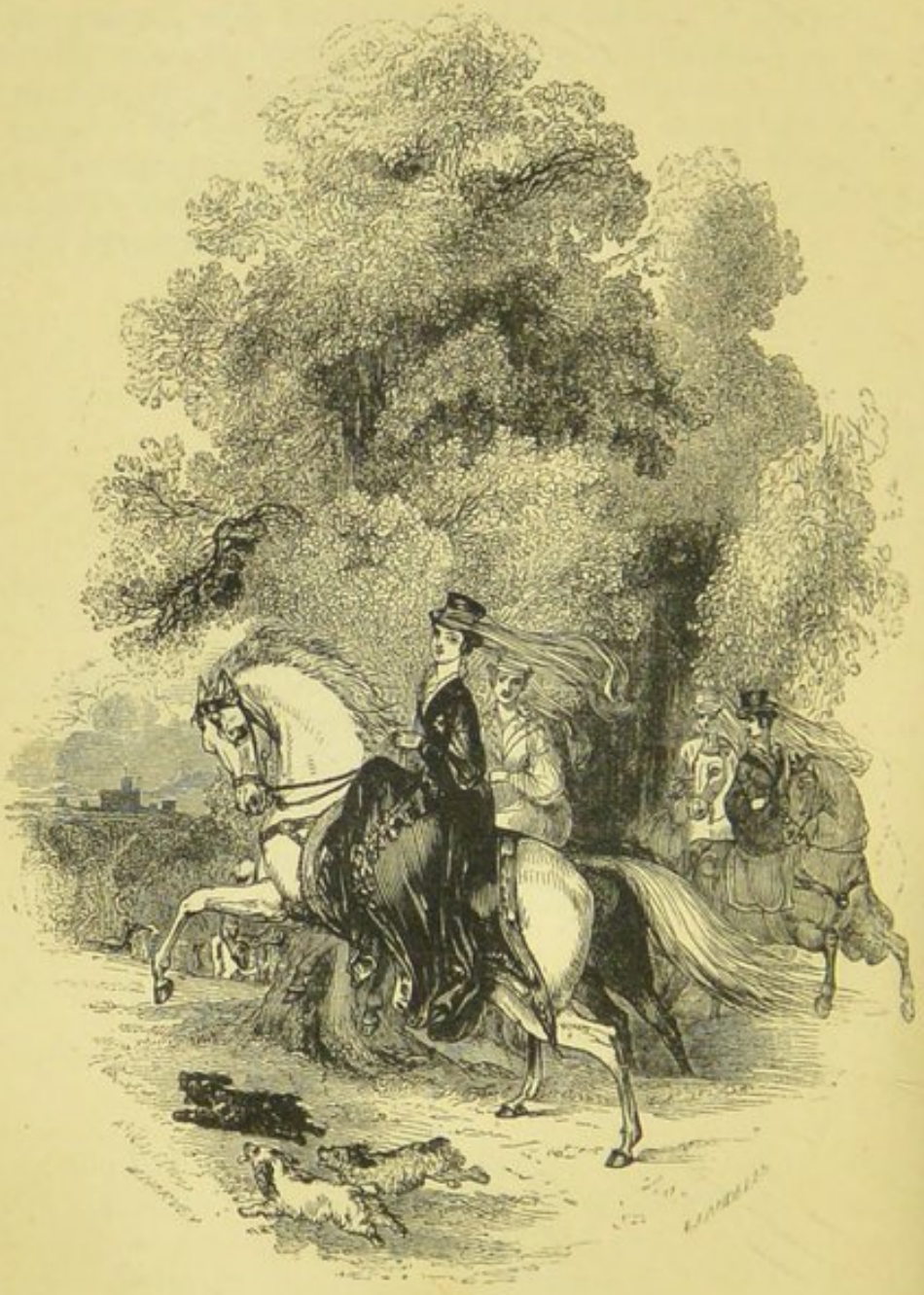
CONCLUDING OBSERVATIONS.

When the young archer has mastered the previous instructions she may begin to shoot at twenty or thirty yards' distance, and then proceed by degrees to forty and sixty yards, and even greater distances. She ought not to proceed to long shots until she is able to hit the target tolerably well at the shorter ones.

Elevation, which means raising the point of the arrow higher than the feathers of it, is an important point. If it be too small, the arrow will fall short of the mark, if too great it will fly over it. Its true extent depends upon practice alone. At moderate lengths, the less the elevation the more certain the shot, for the more the arrow loses the particular curve which it makes in the air when elevated, and approaches in its flight to a point-blank or straight line, the more certain it is to strike the object aimed at. The strong-armed archer, drawing a stronger bow, can reach her object with much less elevation than one who shoots with a weak one.

In point-blank shooting it is necessary to shoot with great strength, that the arrow may go as swiftly as possible, for if the

arrow slackens, it is sure to strike short of the mark. For instance, if the arrow drops one foot in the first second of time, it would, by the laws of mechanics, drop three feet in the next second, and five in the following. If the bull's eye be five feet above the ground, and the arrow is three seconds in travelling to it, it would drop, according to the above calculation, one, three, and five feet, or altogether nine feet, and therefore fall short of the target. If, by the use of greater force, the arrow is propelled in two seconds instead of three, it would only fall four feet, and therefore strike near the rim of the target. A very little increase of speed would carry it to the bull's eye.



RIDING.

RIDING.

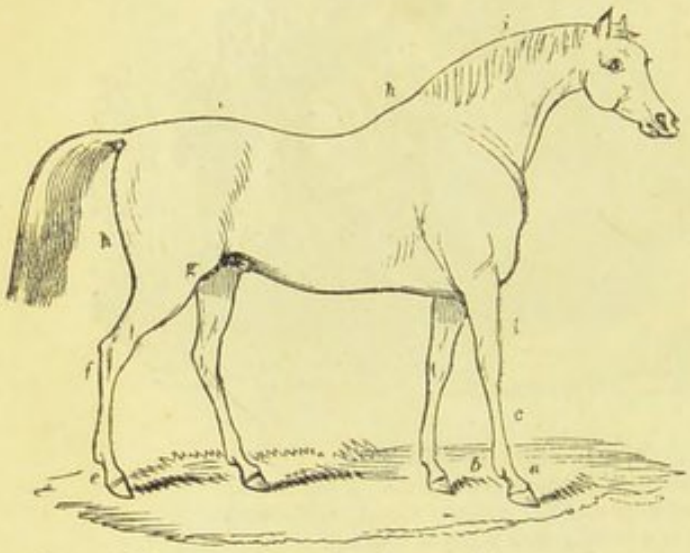
The Virgin Queen, peerless Elizabeth,
With grace and dignity rode through the host;
And proudly paced her gallant steed, as though
He knew his saddle was a royal throne.

HEALTH and cheerfulness, says an old author, are pursued with a better prospect of success on Horseback than in any other manner. Riding, it is generally admitted, ranks in the first class of exercises; but it is an art, which those who are unskilled in can never sufficiently appreciate or truly enjoy; and daily experience proves to us, that the greater portion of those ladies who indulge in it labour under this disadvantage. In no other art are there so many self-taught amateurs; numbers of ladies have a decided objection to going through the ordeal of a riding-school; others do not reside where they can obtain the benefit of a master's instructions; and the generality consider that they are in possession of all that can be acquired on the subject, when they have discovered a mode of retaining their seat and guiding the horse. To such of our readers as happen to belong to either of these classes, and also to those who, having been taught by a riding-master, are still desirous of further improvement, the following treatise will, the writer flatters himself, if carefully perused, be productive of considerable advantage.

DESCRIPTION OF THE HORSE.

A few among the most current equestrian technicalities it will be expedient, in the first place, to notice and explain.

1



Most parts in the external structure of the Horse are known by names of obvious signification; but such is not the case with all.

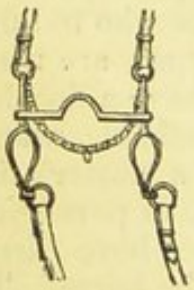
To commence with the anterior limb: *a*, is the fore pastern; *b*, the fetlock; *c*, the leg; and *d*, the arm.

In the hind limb, *e*, is the hind pastern; *f*, the hock; *g*, the stifle; and *h*, the haunch.

The upper surface of the neck, *i*, is denominated the crest; *k*, the withers; and *l*, the croup.

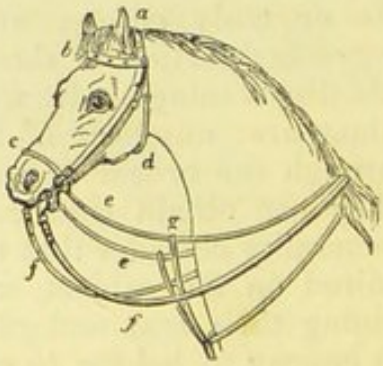
In the bridle, supposing it to be double-reined, *a* is the double

2



Curb Bit.

3



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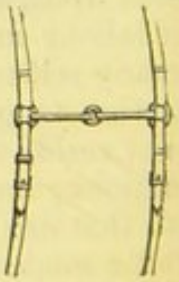
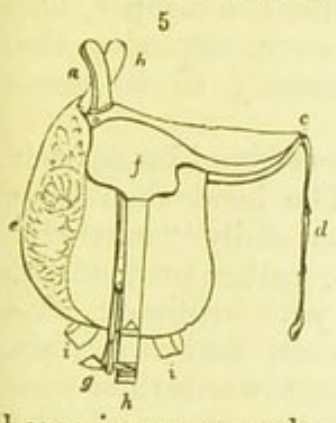


Snaffle Bit.

head-stall; *b*, the front; *c*, the nose-band; *d*, the throat-lash; *e*, *e*, the snaffle rein; and *f*, *f*, the curb rein. At *g*, *g*, is the martingale.



In the saddle, *a*, is the *near* crutch; *b*, the off crutch; *c*, the cantle; *d*, the crupper; *e*, the safe; *f*, the skirt; *g*, the stirrup; *h*, the near side half of the surcingle; and *i*, *i*, the girths.

A lady's right hand is termed the *whip*-hand, and her left the *bridle*-hand.

The *near* side of a horse is that which is on the *left* of the rider; and the *off* side that which is on her *right*.

The height of a horse is always estimated in *hands*, of four inches each; it is always measured at the tip of the shoulder. A horse is never spoken of as being so many hands *tall*, but so many hands *high*.

THE LADY'S HORSE.

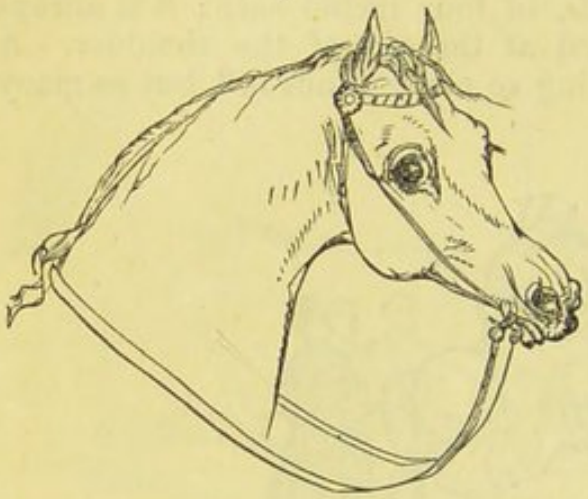
Although the lady usually has a horse selected for her by some gentleman, either of her own family or her acquaintance, it may not be inexpedient to inform the fair reader of those qualities which, combined in the same animal, may be said to constitute a complete lady's horse. Such a creature, however, we must observe, is exceedingly difficult to be procured, even by those possessed of the nicest judgment on the subject; and, to whom, the usually important question of price is not an object of consideration.

The beau ideal of this kind of horse is superlatively elegant in form, exquisitely fine in coat, and unexceptionably beautiful in colour; of a height, in the nicest degree appropriate to the figure of the rider; graceful, accurate, well-united, and thoroughly safe in every pace; "light as a feather" in the hand, though not at all painfully sensitive to a proper action of the bit; bold in the

extreme, yet superlatively docile; free in every respect from what is technically denominated "vice;" excellent in temper, but still "though gentle, yet not dull;" rarely, if ever, requiring the stimulus of the whip, yet submitting temperately to its occasional suggestions.

In some, though not in all respects, the form should approach closely to that of a thorough-bred animal. The head should be small, neat, "well-set" on the neck, and gracefully "carried." The nostrils should be wide; the eyes large, rather protruding, dark, yet brilliant; the ears erect, and delicately tapering towards their tips. The expression of the countenance should be lively, animated, noble, and most highly intelligent; the neck rather arched and muscular; the ridge of the shoulders narrow and elevated; the chest full and fleshy; the back broad; the body round, or barrel-like; the space between the hips and tail long, and very gradually depressed towards the latter organ, which, it is essential, should be based high on the croup. The fore and hind limbs should be distant, the one pair from the other; the "arms" muscular; the knees broad, the hocks (laterally) wide; the legs flat and sinewy; the pasterns rather long; and the hoofs large, and nearly round.

6



A rough, or what is technically termed a "staring" coat, considerably deteriorates the appearance of a horse, however perfect in other conditions. Its surface, on a well-bred, healthy, and properly groomed animal, is not only smooth, but brilliantly polished. The mane, if too long and thick, will interfere with that delicate management of the reins so desirable to a lady on horseback; and the tail, if of immoderate length, will, by the animal's whisking it towards his sides, prove inconvenient to the fair rider at all times; but especially so in dirty weather. Neither of these appendages, however, on the other hand, should be ungracefully brief or scanty.

Of all colours presented by the horse, none is so rich, and at the same time so elegant and chaste, as a bright bay, provided the mane, tail, and lower parts of the legs, be black. A small white star on the forehead, and a white speck on one of the heels, are to

be considered rather as beauties than defects; but much white, either on the face or legs, whatever be the general hue, is quite the reverse of desirable. After the bright bay, chestnut, perhaps, deserves to rank next in the scale of taste, provided it be not, as is very frequently the case, accompanied with white legs. Some of the various shades of grey, however, are, in the opinion of many, entitled to be placed above it; of these, the silver grey, with black mane and tail, claims the highest place. Brown is rather exceptionable, on account of its dulness. Black is not much admired, though, as we think, when of a deep jet, remarkably elegant. Roan, sorrel, dun, piebald, mouse, and even cream colour (however appropriate the latter may be for a state-carriage-horse) are all to be eschewed.

The height of her horse should be in harmonious proportion with that of the rider. A very young or short lady is in no less false a position, as regards grace, on a lofty steed, than a tall, full-grown woman, on a diminutive poney. For ladies of the general stature, a horse measuring from fifteen to fifteen and a half hands at the point of the shoulder, is usually considered, as regards height, more desirable than any other.

In paces, the lady's horse should be perfect, or at all events so far as regards the walk and canter. The former should be fast, bold, firm, and lively, without being unsteady; and the latter light, easy, well-combined, and graceful; so, too, should the hand-gallop, although, it is true, a lady's horse is rarely put to this pace, unless used for the field. The trot, again, is but little practised; still the complete lady's horse is expected to be capable of performing it with great precision of step, and but little concussion to the rider; many ladies regarding it—however discountenanced by the majority, perhaps—as preferable, from its vigour, liveliness, and dash, to any other pace.

To expatiate on the absolute necessity of the lady's horse being safe on his limbs would be needless.

The mouth should be sensible of the most delicate hint of the rider's will, communicated to it by means of the bit. A horse that pulls hard, or hangs heavily upon the reins, is very unsuitable for a lady's use; so, again, is one having the mouth so tender as to suffer from moderate pressure, either by the snaffle or curb. The former is no less fatiguing to, than the latter is distressed by, the bridle-hand.

MOUNTING.

On approaching a horse, the tail of the habit should be gracefully gathered up, and the whip be carried in the right hand (fig. 7). The hat should previously be well secured, and the hair combed back, or otherwise so closely dressed, that neither the wind, the action of the horse, the effect of damp weather, nor exercise, may throw it into disorder. Losing the hat is not only attended with unpleasant consequences of a trifling nature, but its fall may make the horse start, plunge, or even run away; and should it, when blown off the head, be prevented from dropping to the ground by means of a fastening under the chin, the action of raising the whip-hand in a hurry to replace it, accompanied, as it generally is, by a slight flutter of the whole frame of the rider, if either timid or inexperienced, is very likely to alarm the horse, if he happen to be shy or spirited. The hair, if loosely dressed, may lose its curl, and by falling over, or being blown in the eyes of the rider, greatly embarrass and annoy her.

7

It is the groom's duty, when the rider approaches, to gather up the reins with his left hand smoothly and evenly, the bit reins between, and somewhat tighter than the bridoon, properly dividing them with his forefinger (fig. 8). The lady receives them a little more forward than the point of the horse's shoulder, with her right hand, which still retains and passes the whip over the saddle to the off (or right) side; on taking the bridle in this manner, her forefinger is placed between the reins; the groom removes his hand, and the lady draws hers back, suffering the reins to glide gently and evenly through her fingers, until she reaches the near crutch of the pommel, which she takes hold of with her right hand, still holding the whip and reins, and places herself close to

8

the near side of the saddle, with her back almost turned towards it. The groom now quits his former post, and prepares to assist her to mount. The horse being thus left under the lady's government, it is proper, that in passing her hand through the reins she should not have suffered them to become so loose as to prevent her, when her hand is on the pommel, from having a light but steady bearing on the bit, and thus keeping the horse to his position during the action of mounting. She then places her left foot firmly in the right hand of the groom or gentleman in attendance, who stoops to receive it. The lady then lays her left hand on his right shoulder, and straightening her left knee, she bears her weight on her assistant's hand, which he gradually raises (rising himself at the same time) until she is seated on the saddle. During her elevation she steadies, and even, if necessary, partly assists herself towards the saddle by her hands; one of which, it will be recollected, is placed on the pommel, and the other on her assistant's shoulder. It is important that she should keep her foot firm and her knee steady. If these directions be attended to, she will find herself raised to her saddle with but a trifling exertion, either on her own part or that of the assistant. Should the latter be a lad only, or not much accustomed to this part of his business, he should use both hands instead of one (fig. 9),—joining them by the fingers; indeed, this, generally speaking, is the safer mode. The lady in all cases should take care that her weight be well balanced on her left foot, from which she should rise as uprightly as possible; above all things taking care not to put her foot forward, but keeping it directly under her. The assistant should not begin to raise her until she has removed her right foot from the ground, and, by stiffening her knee, thrown her weight completely into his hand. Having reached the saddle, while her face is still turned to the near side of the horse, and before she places her knee over the pommel, the assistant puts the lady's left foot in the stirrup, while she removes her hand from the near to the off crutch of the pommel, holding the whip and reins as before directed. She now raises herself on the stirrup by the aid of her right hand, while the assistant, or the lady herself, with her left hand, draws the habit forward

9

in its place. She then places her right knee in the pommel, and her seat is taken (fig. 10).

10

Should the back part of the habit at this time, or afterwards, in the course of the ride, require arrangement, the lady raises herself in the stirrup, by stiffening her knee and pulling herself forward by the right hand, which is placed on the off crutch of the pommel, and with her left hand disposes her habit to her satisfaction. This can be done, when the rider has grown expert, while the horse is going at any pace, as well, if not better, than if he were standing still, When the lady is seated, the groom sometimes fastens the habit below her left foot, either by pins or a brooch, but this practice is now pretty nearly abandoned.

THE REINS.

Pupils, during their first lessons, may dispose of the reins in the following manner. The right hand is removed from the pommel of the saddle; the reins are separated, and one is held in each, passing up between the third and fourth fingers, the ends being brought over the forefingers, and held in their places by closing the thumbs upon them, and shutting the hands, which should be on a level with each other, at a little distance apart—three inches from the body, or thereabouts—and the knuckles of the little fingers in a line with the elbow. By slightly advancing the hands, or even relaxing the hold of the reins, the horse, if well trained, will go forward. The left hand is raised to turn to the near or left side, and the right hand to turn in an opposite direction. By slightly raising and approaching both hands toward the body, the horse may be made to stop. When either rein is acted on to turn the horse, the other should be a little slackened, or the hand which holds it relaxed.

As soon as the pupil has passed her noviciate in the art, she holds both reins in the left hand: some ladies separate them by the third and fourth fingers; others by one of these fingers only; and many by the fourth and little finger; but the greater number use the latter alone for this purpose, passing the off or right rein over it, and bringing the near or left rein up beneath it. The

reins are carried flat upon each other up through the hand, near the middle joint of the forefinger, and the thumb is placed upon them so that their ends fall down in front of the knuckles. The elbow should neither be squeezed close to the side, nor thrust out into an awkward and unnatural position, but be carried easily and gracefully, at a moderate distance from the body; the thumb should be uppermost, and the hand so placed that the lower part of it be nearer the waist than the upper; the wrist should be slightly rounded, the little finger in a line with the elbow, the knuckles immediately above the horse's neck, and the nails turned towards the rider.

With the reins in this position, if she wish her horse to advance, the lady brings her thumb towards her, until the knuckles are uppermost, and the nails over the horse's neck; the reins by this simple motion are slackened sufficiently to permit the horse to move forward. After he is put in motion, the rider's hand should return to the first position gradually, or it may be slight advanced, and the thumb turned upward immediately.

To turn a horse to the left, let the thumb, which in the first position is uppermost, be turned to the right, the little finger to the left, and the back of the hand brought upward. This movement is performed in a moment, and it will cause the left rein to hang slack, while the right is tightened so as to press against the horse's neck. To turn to the left the hand should quit the first position, the nails be turned upward, the little finger brought in toward the right, and the thumb moved to the left; the left rein will thus press the neck, while the right one is slackened.

To stop the horse, or make him back, the nails should be turned from the first position upwards, the knuckles reversed, and the wrist be rounded as much as possible.

THE SEAT AND BALANCE.

11

The body must always be in a situation as well to preserve the balance, as to maintain the seat (see fig. 11). One of the most common errors committed by ladies on horseback, who have not been properly taught to ride, is hanging by the near crutch, so that instead of being gracefully seated in the centre of the saddle, with

the head in its proper situation, and the shoulders even (fig. 12, *a*), the body is inclined to the left, the head is brought to the right by an inelegant bend of the neck in that direction, the right shoulder is elevated, and the left depressed (fig. 12, *b*).

12

To correct or avoid these and similar faults is important. All the rider's movements should harmonise with the paces of the animal; her position should be at once easy to herself and to her horse, and alike calculated to ensure her own safety and give her a perfect command over him. If she sit in a careless, ungraceful manner, the action of her horse will be the reverse of elegant. A lady seldom appears to greater advantage than when mounted on a fine horse, if her deportment be graceful, and her positions correspond with his paces and attitudes; but the reverse is the case, if, instead of acting with and influencing the movements of the horse, she appears to be tossed to and fro, and overcome by them. She should rise and descend, advance and stop with, and not after the animal. From this harmony of motion results ease, elegance, and the most brilliant effect. The lady should sit in such a position that the weight of the body may rest on the centre of the saddle; one shoulder should not be advanced more than the other; neither must she bear any weight on the stirrup, nor hang by the pommel over the near side; she ought not to suffer herself to incline forward, but partially backward. If she bend forward, her shoulders will most likely be rounded, and her weight thrown too much upon the horse's shoulders; in addition to these disadvantages, the position will give her an air of timid *gaucherie*. Leaning a little backward, on the contrary, tends to bring the shoulders in, keeps the weight in its proper bearing, and produces an appearance of comely confidence.

The head should be in an easy, natural position; that is, neither drooping forward nor thrown back,—neither leaning to the right nor to the left. The bust should be elegantly developed, by throwing back the shoulders, advancing the chest, and bending the back part of the waist inward. The elbows should be steady, and kept in an easy, and apparently unconstrained position near the

sides; the lower part of the arm should form a right angle with the upper part, which ought to descend almost perpendicularly from the shoulder. The position of the hands, when both are occupied with the reins, or when the reins are held in one only, we have already noticed; the right arm and hand, in the latter case, may drop easily from the shoulder, and the whip be held in the fingers, with the lash downward, between two fingers and the thumb. The whip may also be carried in the right hand, in the manner adopted by gentlemen: the lady is not restricted to any precise rules in this respect, but may vary the position of her whip arm as she may think fit, so that she do not permit it to appear ungraceful (figs. 13 and 14). She must also take care that the whip be so carried, that its point do not tickle or irritate the flank of the horse.

The stirrup is of very little use except to support the left foot and leg, and to assist the rider to rise in the trot: generally speaking, therefore, as we have already remarked, none of the weight of the body should be thrown upon the stirrup. The left leg should not be cramped up, but assume an easy and comfortable position: it should neither be forced out, so as to render the general appearance ungraceful, and the leg itself fatigued; nor should it be pressed close to the horse, except when used as an aid; but descend gracefully by his side, without bearing against it.

Although hanging by the left crutch of the pommel, over the near side, is not only inelegant, but objectionable in many important respects, the pommel, properly used, is a lady's principal dependence on horseback: by the right knee being passed over the near crutch, the toes slightly elevated, and the leg pressed against the fore-flap of the saddle, the pommel is grasped, and the rider well secured in the possession of her seat. It is said, that when a lady, while her horse is going at a smart trot,

can lean over on the right side, far enough to see the horse's shoe, she may be supposed to have established a correct seat; which, we repeat, she should spare no pains to acquire. In some of the schools, a pupil is often directed to ride without the stirrup, and with her arms placed behind her, while the master holds the longe, and urges the horse to various degrees of speed, and in different directions, in order to settle her firmly and gracefully on the saddle,—to convince her that there is security without the stirrup, —and to teach her to accompany, with precision and ease, the various movements of the horse.

Nothing can be more detrimental to the grace of a lady's appearance on horseback, than a bad position: a friend of ours says, it is a sight that would spoil the finest landscape in the world. What can be much more ridiculous, than a female, whose whole frame, through mal-position, seems to be the sport of every movement of the horse? It is certainly rather painful to behold such a sight. If the lady be not mistress of her seat, and be unable to maintain a proper position of her limbs and body, so soon as her horse starts into a trot she runs the risk of being tossed about on the saddle. If the animal should canter, his fair rider's head will be jerked to and fro like "a vexed weathercock;" her drapery will be blown about, instead of falling gracefully around her; and her elbows rise and fall, or, as it were, flap up and down like the pinions of an awkward nestling endeavouring to fly. To avoid such disagreeable similes being applied to her, the young lady, who aspires to be a good rider, should, even from her first lesson in the art, strive to obtain a proper deportment on the saddle. She ought to be correct, without seeming stiff or formal; and easy, without appearing slovenly. The position we have described, subject to occasional variations, will be found, by experience, to be the most natural and graceful mode of sitting a horse;—it is easy to the rider and her steed; and enables the former to govern the actions of the latter so effectually, in all ordinary cases, as to produce that harmony of motion which is so much and so deservedly admired.

The balance is conducive to the ease, elegance, and security of the rider;—it consists in a foreknowledge of what direction any given motion of the horse would throw the body, and a ready adaptation of the whole frame to the proper position, before the horse has completed his change of attitude or action;—it is that disposition of the person, in accordance with the movements of the horse, which prevents it from an improper inclination forward or backward, to the right or to the left.

The balance is governed by the direction and motion of the horse's legs. If theanimal be either standing still, or merely walk

ing straight forward, the body should be preserved in the simple position which we have directed the lady to assume on taking her seat. Should it be necessary to apply the whip, so as to make the animal quicken his pace, or to pull him in suddenly, the body must be prepared to accommodate itself to the animal's change of action. When going round a corner at a brisk pace, or riding in a circle, the body should lean back rather more than in the walking position: in the same degree that the horse bends inward, must the body lean in that direction. If a horse shy at any object, and either turn completely and suddenly round, or run on one side only, the body should, if possible, keep time with his movements, and adapt itself so as to turn or swerve with him: otherwise the balance will be lost, and the rider be in danger of falling off on the side from which the horse starts.

The proper mode of preserving the balance under some other circumstances, will be found described in the course of the following pages. In no case, be it remembered, should the rider endeavour to assist herself in preserving her balance, by pulling at the reins.

AIDS AND DEFENCES.

All those motions of the body, the hands, the legs, and the whip, which either indicate the rider's wishes, or, in some degree, assist the horse to perform them, are, in the art of Riding, denominated aids. Those movements of the rider which tend to save the animal from disuniting himself, or running into danger, may, properly enough, be classed under the same title; while such as act for the preservation of the rider, against the attempts of the horse, when headstrong or vicious, may more properly perhaps be called defences.

16

The aids of the hand are considered the most important; the rein, in horsemanship, may, in fact, be considered in the same light as the helm in navigation; all the other movements of the rider, tending principally to assist the bridle-hand, and carry its

operations into more complete effect. There should be a perfect harmony in the aids; and all of them ought to be governed by those of the rein. In many instances, the power of a defence performed by the hand may be destroyed by the omission of a correct accompanying aid with the body or the leg. Thus, if a horse rear, it is useless for the rider to afford him a slack rein, if she do not also lean forward, in order, by throwing her weight on his foreparts, to bring him down, and also to save herself from falling backward over his haunches. Should the rider, when her horse rises, slacken the reins, but retain her usual position on the saddle,—if he rear high,—she must necessarily be thrown off her balance; and then, if she hang on the bit, in order to save herself from falling, there is great danger of her pulling the horse over upon her. Instances might be multiplied of the necessity of the other aids, or defences, acting as accompaniments to those of the hand: we trust, however, that our readers will be satisfied with the one we have given.

The aids and defences of the body are numerous; we shall attempt to describe a few of them; and the residue must be acquired by practice and observation. When the rider indicates by her hand that she wishes the horse to advance, the body should be inclined forward in a slight degree; the left leg and, if the animal be sluggish or not well trained, the whip pressed to his sides. Should she, by pulling the rein towards her, or turning the wrist in the manner we have before directed, communicate her desire to stop, her body ought, at the same time, to be thrown back with gentleness, or otherwise, in proportion to the severity of the action of the hand, against the horse's inclination to increase his speed contrary to the will of his rider, or when he leaps, kicks, or plunges. If a horse rear, the rider should lean forward more than in the aid for the advance; but care must be taken, in this case, to perform the defence with discretion, especially with a poney, or galloway; for should the animal rise suddenly, and the rider throw herself abruptly forward, it is not improbable that he will give her a dangerous blow in the face with the top of his head.

We have already stated, in a previous part of our little treatise, the direction which the body should take when riding in a circle, turning a corner, or acting as a defence against the danger attendant upon a horse's shying. In the first case, the aid of the body, if properly performed, will carry with it the aid of the hand, the leg, and even the whip, if it be held near the horse's side. We will explain this by an example. Suppose the rider wishes to turn a corner on her left; she inclines a little towards it, drawing

her left shoulder in, and thrusting her right shoulder rather forward; the bridle-hand will thus be drawn back on the near side, the off rein consequently act on the horse's neck, and the left leg be pressed close against the near side; so that all the necessary aids for effecting her object are performed by a single natural and easy movement of the body.

The aids of the whip on one side correspond with those of the leg on the other; they are not only used in the manner we have already mentioned, when the rider wishes her horse to advance, or increase his pace, but also in opening a corner, &c. If the lady be desirous of turning to the left, she may materially aid the operation of the hand, which directs the fore-parts of the horse to the near side, by pressing him with her stirrup leg, so as to throw his croupe in some degree to the right, and thereby place it in a more proper position to follow the direction of his shoulders; in turning to the right, the whip may be made equally useful by driving out his croupe to the left. The power of these aids, especially that of the whip, should be increased as circumstances require. The aid which is sufficient for nine horses may not be powerful enough to serve for the tenth; and even with the same animal, while the slightest pressure will produce the desired effect in many cases, a moderate and sometimes a smart lash with the whip is necessary in others. The degree of severity must be governed by circumstances, and the rider's own experience and judgment.

SOOTHINGS, ANIMATIONS, &c.

17

The voice and the hand, the leg and the whole body, may be employed to soothe and encourage. High-mettled or fretful horses it is often necessary to soothe, and timid ones to encourage. A spirited animal is frequently impatient when first mounted, or if a horse or a carriage pass him at a quick rate; and some horses are even so ardent and animated, as to be unpleasant when in company with others. In any of these cases, the rider should endeavour to soothe her horse by speaking to him in a gentle, calm tone; she

should suffer the whip to be as motionless as possible, and take even more than usual care that its lash do not touch the flank; her seat should be easy, her leg still, and her bridle-hand steady; the bit should not be made to press on the horse's mouth with greater severity than is necessary to maintain the rider's command; and as the horse gradually subsides from his animation, its bearing should be relaxed in proportion. The perfection of soothing consists in the rider sitting so perfectly still and easy as not to add in the least to the horse's animation, at the same time being on her guard, so as to be able to effect any of her defences in an instant, should they be necessary.

There is scarcely any difference between soothings and encouragements; except that in the latter it is advisable to pat, and, as it were, caress the horse with the right hand, holding the whip in the left. A shy or timid horse may often be encouraged to pass anything that alarms him on the road, to cross a bridge, enter a gateway, or take a leap, when force and correction would only add to his fears, and perhaps render him incorrigibly obstinate.

Animations are intended to produce greater speed, or to render the horse more lively and on the alert without increasing his pace. Some animals scarcely ever require animations, while others are so dull and deficient in mettle, as to call them frequently into use. The slightest movement of the body, the hand, or the leg, is enough to rouse the well-bred and thoroughly-trained animal; but it is necessary for the animations to be so spirited and united with sluggish horses, as almost to become corrections; in fact, what is a mere animation to one horse would be a positive correction to another.

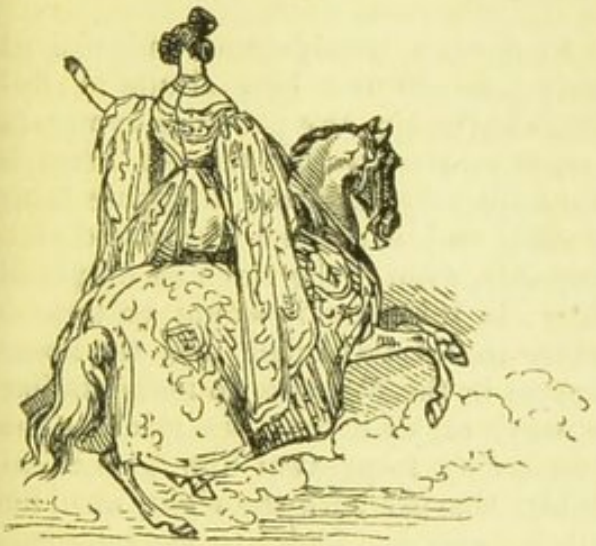
The aids of the hand, the whip, the leg, and the body, which we have before described, are animations; so also are pattings with the hand, the tones of the voice, &c. Animations should be used in all cases when the horse, contrary to the rider's inclination, either decreases his speed, droops his head, bears heavily and languidly on the bit, or begins to be lazy or slovenly in his pace. A good rider foresees the necessity of an animation before the horse actually abates his speed, or loses the *ensemble* of his action, and the grace and spirit of his deportment, and the slightest movement is then generally sufficient. It is much easier to keep up than to restore a horse's animation, therefore, the whip, the leg, the hand, or the tongue, should do its office a few moments before, rather than at a time when its movements are indispensable. A slight motion of the fingers of the bridle-hand serves as an excellent animation; it reminds the horse of his duty, awakens the sensibility of his mouth, and preserves the correspondence between that and the hand. When it is necessary

to recur to animations frequently, they ought to be varied; even the whip, if it be often used, unless with different degrees of force, will lose its effect.

CORRECTIONS.

Ladies certainly ought not to ride horses which require extraordinary correction. For numerous reasons, which must occur to our readers, a lady should never be seen in the act of flogging her steed; such a sight would destroy every previous idea that had been formed of her grace or gentleness; but moderate corrections are sometimes necessary, and the fair rider should make no scruple of having recourse to them when absolutely needful, but not otherwise. Astley, in his work on the management of the horse, after very properly recommending all quarrels between the steed and his rider to be avoided, observes, that too great a degree of indulgence may induce the horse to consider that you are afraid of him; and, he adds, if he should once think you are really so, you will find he will exercise every means to convince you that he considers himself your master, instead of acknowledging, by implicit obedience, that you are his. This is a very correct observation, and it is discreet "to check rebellion in its very bud;" this may be done in most cases, by corrections of a very gentle nature.

18



Those who imagine that a horse is to be corrected only with the whip are very much mistaken. The aids and animations of the leg, the bridle-hand, the body and the voice, may be made sufficiently severe to correct and render a horse obedient in all ordinary cases. Severe flogging seldom produces any good effect; and in most quarrels between a horse and his rider, when both get out of temper, the former usually gains some important advantage. The best way to correct a horse is to dishearten and make him do what he would fain avoid—not so much by force and obstinate resolution, in contesting openly and directly with him when he is able and prepared to resist, but by a cool opposition and indirect means. There are different methods of attaining the

same end, and those which are the least obvious to the animal should be adopted; a rider cannot rival him in bodily power, but she may conquer him by the exercise of superior ingenuity.

Mr. Rarey in his recent book on horse taming (which may be had anywhere for sixpence) has shown that the most vicious horses may be rendered perfectly docile in a few hours, by a system of encouragement and gentle treatment.

VICES.

Some horses are addicted to a very troublesome and vicious habit of turning round suddenly—we do not here allude to shyness, but restiveness—without exhibiting any previous symptom of their intention. A horse soon ascertains that the left hand is weaker than the right, and consequently less able to oppose him; he therefore turns on the off side, and with such force and suddenness, that it is almost impossible, even if the rider be prepared for the attack, to prevent him; in this case it would be unwise to make the attempt; the rider would be foiled, and the horse become encouraged, by his success in the struggle, to make similar endeavours to have his own way, or dismount his rider. The better plan is, instead of endeavouring to prevent him from turning with the left hand, to pull him sharply with the right, until his head has made a complete circle, and he finds, to his astonishment, that he is precisely in the place from which he started. Should he repeat the turn on the rider's attempting to urge him forward, she should pull him round on the same side three or four times, and assist the power of the hand in so doing, by a smart aid of the whip or the leg; while this is doing, she must take care to preserve her balance by an inclination of the body to the centre of the circle which is described by the horse's head in his evolution. The same plan may be pursued when a horse endeavours to turn a corner contrary to the wish of his rider; and if he be successfully baffled three or four times, it is most probable that he will not renew his endeavours. On the same principle, when a horse refuses to advance, and whipping would increase his obstinacy, or make him rear, or bolt away in a different direction, it is advisable to make him walk backward, until he evinces a willingness to advance. A runaway might in many instances be cured of his vice by his being suffered to gallop unchecked, and being urged forward, especially up a hill or over ploughed ground, when he showed an inclination to abate his speed, rather than by attempting to pull him in; but this remedy is, in most situations, dangerous, even for men; and all other means should be tried before it is resorted to by the rider. Should either of our fair

readers have the misfortune to be mounted on a runaway, she may avoid any evil consequences if she can contrive to retain her self-possession, and act as we are about to direct. She must endeavour to maintain her seat at all hazards, and to preserve the best balance or position of body to carry her defences into operation; the least symptom of alarm on her part will increase the terror or determination of the horse; a dead, heavy pull at the bridle will at once aid rather than deter him in his speed, and prevent her from having sufficient mastery over his mouth and her own hands to guide him; she must, therefore, hold the reins in such a manner as to keep the horse together when at the height of his pace, and to guide him from running against anything in his course, and it is most probable that he will soon abate his speed, and gradually subside into a moderate pace. Sawing the mouth (that is, pulling each rein alternately,) will frequently bring a horse up in a few minutes; slackening the reins for an instant, and then jerking them with force, may also produce a similar effect; but if the latter mode be adopted, the rider must take care that the horse, by stopping suddenly, do not bring her on his neck, or throw her over his head. In whatever manner the runaway be stopped, it is advisable to be on the alert, lest he should become so disunited by the operation as to fall.

There is another situation, in which it is advisable to force the horse apparently to have his own way, in order to baffle his attacks. Restive horses, or even docile animals, when put out of temper, sometimes endeavour to crush their riders' legs against walls, gates, trees, posts, &c. An inexperienced rider, in such a situation, would strive to pull the horse away: her exertions would be unavailing; the animal would feel that he could master the opposition, and thus discovering the rider's weakness, turn it to her disadvantage on future occasions. We cannot too often repeat, that although a rider should not desist until she have subdued her horse, she must never enter into an open, undisguised contest with him. It is useless to attack him on a point which he is resolute in defending; the assault should rather be directed to his weaker side. If he fortify himself in one place, he must proportionally diminish his powers of defence in another; he anticipates and prepares to resist any attempt to overcome him on his strong side; and his astonishment at being attacked on the other, and with success, on account of his weakness in that quarter, goes far to dishearten and subdue him. If he plant himself in a position of resistance against being forced to advance, it is a matter of very little difficulty to make him go back. If he appear to be determined not to go to the right, the rider may, on account of the mode in which he disposes his body and limbs, with great facility turn him to the

left. If he stand stock-still, and will not move in any direction, his crime may be made his punishment; the rider should sit patiently until he show a disposition to advance, which he will probably do in a very short time, when he discovers that she is not annoyed by his standing still. Nothing will subdue a horse so soon as this mode of turning his attacks against himself, and making his defences appear acts of odedience to the rider's inclination. When, therefore, a horse viciously runs on one side towards a wall, pull his head forcibly towards it; and if, by the aid of the leg or whip, you can drive his croupe out, you may succeed in backing him completely away from it. It is by no means improbable, that when he finds that his rider is inclined to go to the wall as well as himself, he will desist; should he not, his croupe may be so turned outward, that he cannot do his rider any mischief.

In shying, the same principle may be acted upon more advantageously, perhaps, than in any other instance. If a horse be alarmed at any object, and, instead of going up to or passing it, he turn round, the rider should manage him in the manner recommended in cases where the horse turns through restiveness; he should then be soothed and encouraged, rather than urged by correction, to approach or pass the object that alarms him: to attempt to force him up to it would be ridiculous and dangerous. If the horse swerve from an object, and try to pass it at a brisk rate, it is useless to pull him towards it; for if you succeed in bringing his head on one side, his croupe will be turned outward, and his legs work in an opposite direction: this resistance will increase proportionally to the exertions made by the rider. A horse, in this manner, may fly from imaginary into real danger; for he cannot see where he is going, nor what he may run against. Pulling in the rein, therefore, on the side from which the horse shies, is improper; it should rather be slackened, and the horse's head turned away from the object which terrifies him: by this mode, a triple advantage is gained: in the first place, the horse's attention is diverted to other things; secondly, — the dreaded object loses half its terrors when he finds no intention manifested on the rider's part to force him nearer to it; and lastly,— he is enabled to see, and, consequently, avoid any danger in front, or on the other side of him.

A horse may be coaxed and encouraged to go up to the object that alarms him; and if the rider succeed in making him approach it, a beneficial effect will be produced; the horse will discover that his fears were groundless, and be less likely to start again from any similiar cause. After the first impulse of terror has subsided, the horse, if he be properly managed, will even manifest an inclination to approach and examine the object that alarmed

him ; but while he is so doing, the rider must be on her guard ; for the least movement, or timidity, on her part,—the rustling of a leaf, or the passing of a shadow,— will, in all probability, frighten him again, and be will start round more violently than before. After this it will be exceedingly difficult to bring him up to the object. Mr. Astley, however, whom we have before quoted, says, that should the first trial prove unsuccessful, it must be repeated, until you succeed ; observing, that the second attempt should not be made until the horse's fears have subsided, and his confidence returned. A horse that is rather shy may, in many cases, be prevented from starting, by the rider turning his head a little away from those objects which she knows by experience are likely to alarm him, as well before she approaches as while she passes them.

Although a lady ought to avoid riding any horse that is addicted to shying, stumbling, rearing, or any other vice, she ought, nevertheless, to be prepared against their occurrence ; for, however careful and judicious may be those persons by whom her horse is selected, she cannot be sure, when she takes the reins, that she may not have to use her defences against rearing or kicking, or be required to exercise her skill to save herself from the dangers attendant on starting or stumbling before she dismounts. The quietest horse may exhibit symptoms of vice, even without any apparent cause, after years of good behaviour ; the best-tempered are not immaculate, nor the surest-footed infallible ; it is wise, therefore, to be prepared against frailty or accident.

Stumbling is not only unpleasant, but dangerous ; to ride a horse that is apt to trip, is like dwelling in a ruin : we cannot be comfortable if we feel that we are unsafe ; and, truly, there is no safety on the back of a stumbling nag. The best advice we can offer our readers as to such an animal, is, never to ride him after his demerits are discovered : although the best horse in the world may, we must confess, make a false step, and even break his knees. When a horse trips, his head should be raised and supported by elevating the hand ; and the lady should instantly throw herself back, so as to relieve his shoulders of her weight. It is useless to whip a horse after stumbling (as it is also after shying) ; for it is clear he would not run the risk of breaking his knees or his nose, if he could help it. If a horse be constantly punished for stumbling, the moment he has recovered from a false step he will start forward, flurried and disunited, in fear of the whip, and not only put the rider to inconvenience, but run the risk of a repetition of his mishap before he regains his self-possession. It being generally the practice,—and a very bad practice it is,—for riders to correct horses for stumbling, we may discover an habitual from an

occasional stumbler, by this circumstance: namely,—when a horse, that is tolerably safe, makes a false step, he gathers himself up, and is slightly animated for a moment or two only, or goes on as if nothing had happened; but if he be an old offender, he will remember the punishment he has repeatedly received immediately after a stumble, and dash forward in the manner we have described, expecting the usual accompaniment to his misfortune.

When a horse evinces any disposition to kick, or rear, the reins should be separated and held in both hands, in the manner we have described in a previous page. This should also be done when he attempts to run away, grows restive, or shies. The body should also be put in its proper balance for performing the defences: it should be upright, the shoulders thrown back, the waist brought forward, and the head kept steady. Every part of the frame must be flexible, but perfectly ready for action. The danger attendant on the horse's rearing is, that the rider may fall off over the croupe, or pull the horse backward upon her. To prevent either of these consequences, immediately a horse rises, slacken the reins, and bend the body forward, so as to throw its weight on his shoulders (fig. 19); and the moment his fore-feet come to the ground,—having recovered your position gradually as he descends,—correct him smartly, if he will bear it; or endeavour to pull him round two or three times, and thus divert him from his object: the latter course may also be adopted to prevent his rearing, if the rider can foresee his intention. We have made some other observations on this subject in a preceding page, to which we beg to refer our reader.

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A horse that displays any symptoms of kicking, should be held tight in hand: if his head be kept up, he cannot do much mischief with his heels. If, however, when the rider is unprepared, in spite of her exertions he should get his head down, she must endeavour, by means of the reins, to prevent the animal from throwing himself down, and also by a proper inclination of her body backward, save herself from being thrown forward (fig. 20). If the least opportunity should occur, she must try to give him two or three sharp turns: this may also be done with advantage, if she detect any incipient attempts in the animal to kick. A

horse that rears high seldom kicks much, but he may do both alternately; and the rider should be prepared against his attempts, by keeping her balance in readiness for either of the corresponding defences. She must also take care, that while she is holding her horse's head up, and well in hand, to prevent him from kicking, she do not cause him to rear, by too great a degree of pressure on his mouth. It is proper to observe, that if a horse be chastised for either of these vices, the whip should be applied to the shoulder for kicking, and behind the saddle for rearing; but we must needs remark that correction on the shoulder is in some degree likely to make a kicking horse rear; and on the flank, or hind quarters, to make a rearing horse kick. The rider, however, cannot do better, under the circumstances, than to correct the positive evil, notwithstanding the possible consequences, in the manner we have directed.

20

EXERCISES IN THE PACES, &c.

Although our limits will not permit us to enter into an elaborate detail of the lessons taken by a pupil in the riding-school, it is right that we should give the learner a few useful hints on the rudiments of Riding, and not devote our whole space to the improvement of those who have made considerable progress. While we endeavour to correct bad habits in the self-taught artist,—in the pupil of a kind friend, an affectionate relative, or of a mere groom,—to confirm the regularly-educated equestrian in the true principles and practice of the art,—to remind her of what she has forgotten, and to improve upon the knowledge she may have acquired,—we must not forget those among our young friends, who, having never mounted a horse, are desirous of learning how to ride with grace and propriety, and who dwell at a distance, or do not feel inclined to take lessons from a master. To such, one third, at least, of our preceding observations are applicable; and we recommend an attentive perusal of what we have said, as to mounting, the aids,

the balance, position, &c., before they aspire to the saddle. Our other remarks they will find useful when they have acquired a little practice.

A quiet and well-trained horse, and a careful attendant, should, if possible, be procured. A horse, that knows his duty, will almost instruct his rider; and if a friend, who is accustomed to horses, or a careful servant, accompany the pupil, there is little or nothing to fear, even in the first attempts: the friend, or groom, may also, by his advice, materially assist the learner in her progress.

WALKING.

Let the pupil walk the horse forward in a straight line, and at a slow rate, supporting his head in such a manner as to make him keep time in the beats of his pace; but not holding the reins so tight as to retard the measurement of his steps, or to make him break into a trot on being animated (fig. 21). The hand should be so carried, that it may delicately, but distinctly, feel, by the operation of the horse's mouth on the reins, every beat of his action. If he do not exert himself sufficiently, he must be slightly animated. Should he break into a trot, he must be checked by the reins; but the pull must neither be so firm nor continued as to make him stop. The moment he obeys the rein and drops into a walk, the hand is to be relaxed into its previous position. Should he require animating again, the movement for that purpose must be more gentle than before, lest he once more break into a trot.

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After walking in a straight line for a short time, the pupil should practise the turn to the right and to the left; alternately using both hands in these operations, in the manner directed in a previous page. She must observe, that when she pulls the right rein to turn the horse on that side, the other hand must be relaxed and lowered, or advanced, to slacken the left rein and ease the horse's mouth, and *vice versâ*.

If the horse will not readily obey the hand in turning, or do not bring forward his croupe sufficiently, he is to be urged to throw

himself more on the bit, by an animation of the leg or whip. The animations, during the first lessons, should be commenced with great gentleness, and the rider will easily discover, by a little experience, to what degree it is necessary to increase them, in order to procure obedience. This observation should be attended to, were it only for the pupil's safety; for if she begin with her animations above the horse's spirit, his courage will be so raised as to endanger, or, at least, alarm her; and thus render what would otherwise be an agreeable exercise, unpleasant.

After the pupil has practised walking in a straight line, and turning on either side, for a few days, she may walk in a circle, and soon make her horse wheel, change, demi-volt, &c. The circle should be large at first; but when the pupil has acquired her proper equilibrium, &c., it must, day by day, be gradually contracted.

In riding round a circle, the inner rein is to be rather lowered, and the body inclined inward: this inclination must be increased during succeeding lessons, as the circle is contracted, and the pupil quickens the pace of her horse. She must practise in the large circle, until she is able, by her hand and aids, to make the horse perform it correctly. The inside rein must be delicately acted upon: if it be jerked at distant intervals, or borne upon without intermission, the horse, in the former case, will swerve in and out; and in the latter, the rider's hand and the animal's mouth will both become in some degree deadened; and thus their correspondence will be decreased. In order to procure correct action, the inner rein should be alternately borne on in a very slight degree, and relaxed the next instant,—the hand keeping exact time in its operations with the cadence of the horse's feet. The direction is to be frequently changed, the pupil alternately working to the right and the left, so as to bring both her hands into practice.

As soon as the rider becomes tolerably well confirmed in her seat and balance, and in the performance of the simple aids and animations, as well in large as small circles, she should begin to ride in double circles,—at first, of considerable diameter, but decreasing them by degrees as she improves. Riding in double circles is guiding the horse to perform a figure of 8; and this, in the language of the riding-school, is effecting the large and narrow change, according to the size of the circles. The number of the circles may be increased, and the sizes varied, with great advantage, both to the rider and the horse. They may be at some distance from each other, and the horse be guided to work from one to the other diagonally. Thus, suppose he starts from *a* (fig. 22), he may be made to leave the upper circle at *e*, and enter the

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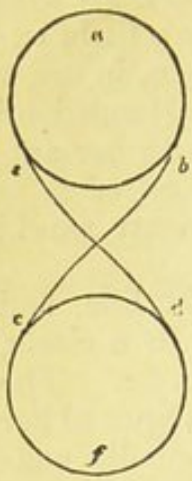
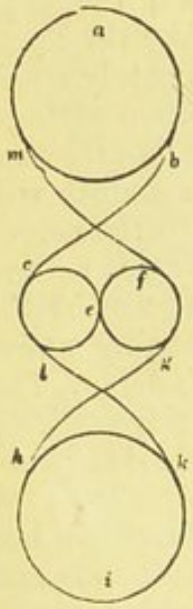


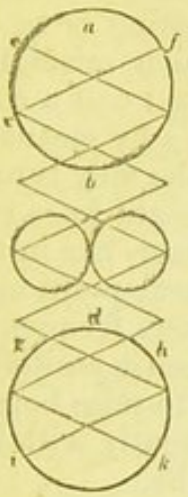
lower one at *d;* leave it at *c*, and enter the first again at *b;* and so continue for some time: then begin at *f*, quit the lower circle at *c*, enter the upper one at *b*, leave it at *e*, and enter the lower circle again at *d*. Thus the position of the rider and horse are alternately changed, from working from the right to a straight line, thence to the left, thence to a straight line, and thence again to the right. To give an instance of riding in a greater number of circles, of different diameters, let the horse start from *d* (fig. 23), and leave the upper circle at *b*, traversing to the outer small circle at *c*, passing round by *d*, entering the inner circle at *e*, passing round by *f* to *g*, quitting it at *g*, and entering the lower circle at *h;* quitting the latter again, after passing round *i*, at *k*, and thence proceeding toward the outer small circle, entering at *l*, going round and entering the inner circle at *e*, passing round by *g*, quitting it at *f*, to return again to *a* by entering the upper circle at *m*. These exercises may be diversified in various ways: the pupil, for instance, may perform the upper circle, and one or both of the lower ones, return to the upper circle, cross from that, diagonally, to the lower circle, quit it at *h* or *k* to perform one of the middle circles, return to the lower circle again, pass thence to the other middle circle, and quit it at *c* or *f* (as the case may happen) to return to the upper circle again. Nothing can be more beneficial than this variety of action: it tends at once to confirm the pupil in her seat; to exercise her in her balance and aids; and to render the horse obedient; but if he be kept in only one direction, he will perform the figure mechanically, without either improving his own mouth and action, or the rider's hand, aids, or balance.

23



In horsemanship, working on a circle is called a *volt;* in angles, or a ziz-zag direction, *changes reverse;* and on half a circle from a line, a *demi-volt.* These figures may first be performed separately: but there can be no objection to the demi-volt and changes reverse to be afterward embodied into the exercises on circles. As in the last figure, the pupil may work from *a* (fig. 23), as directed, for some time; then perform the variations, by going across from *a* to *b*, and describe a demi-volt round by *c e* to *a;* then return from *a* to *b*, and work a demi-volt, in an opposite direction, from *b* to *a:* thence the pupil may proceed in a line, enter

24



the lower circle at *d*, and recommence riding in circles. The change reverse may at any time be performed, by quitting the upper circle at *e* or *f*, and working on the traversing lines, so as to cross the lower circle at *g* or *h*, and enter it at *i* or *k*. In fact, these exercises may be varied *ad libitum;* and the more they are diversified, the greater advantage the pupil will derive from them, provided she persevere until she can perform one figure with accuracy, before she enter upon another that is more complicated. Should the horse, in changing, yield his head, but withhold his croupe, so as to destroy the union of his action, or mar the perfection of the change, the rider should bring it to the proper position or sequence, by the aid of the whip or leg, as the case may be.

TROTTING.

The pupil should begin to practise the trot (fig. 25) as soon as she is tolerably perfect in the walking lessons. It may be as well for her, at first, to trot in a straight line; she may then work in the large circle, and proceed gradually through most of the figures which she has performed in a walk. To make the horse advance from a walk to a trot, the fore-hand should be slightly elevated, by drawing upward the little finger of each hand (or that of the left hand only, when the pupil has advanced enough to hold the reins in one hand), and turning them toward the body. An animation of the leg and whip should accompany this motion. The trot should be commenced moderately: if the horse start off too rapidly, or increase the pace beyond the rider's inclination, she must check him, by closing the hands firmly; and if that will not suffice, by drawing the little fingers upward and toward the body: this must not be done with a jerk, but delicately and gradually; and as soon as the proper effect is produced, the reins are again to be slackened. If the horse do not advance with sufficient speed, or do not bring up his haunches well, the animations used at starting him are to be repeated. When the horse proceeds to

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the trot, the pupil must endeavour to preserve her balance, steadiness, and pliancy, as in the walk. The rise in trotting is to be acquired by practice. When the horse in his action raises the rider from her seat, she should advance her body, and rest a considerable portion of her weight on the right knee; by means of which, and by bearing the left foot on the stirrup, she may return to her former position without being jerked; the right knee and the left foot, used in the same manner, will also ease her in the rise. Particular attention must be paid to the general position of the body while trotting: in this pace ordinary riders frequently rise to the left, which is a very bad practice, and must positively be avoided. The lady should also take care not to raise herself too high; the closer she maintains her seat, consistently with her own comfort, the more correct her appearance will be.

CANTERING.

The whole of the exercises in circles should next be performed in a canter, which may be commenced from a short, but animated trot, a walk, or even a stop. If the horse be well trained, a slight pressure of the whip and leg, and an elevation of the horse's head, by means of the reins, will make him strike into a canter. Should he misunderstand, or disobey these indications of the rider's will, by merely increasing his walk or trot, or going into the trot from a walk, as the case may be, he is to be pressed forward on the bit by an increased animation of the leg and whip; the reins, at the same time, being held more firmly, in order to restrain him from advancing too rapidly forward to bring his haunches under him; for the support of which in this position, he will keep both his hind feet for a moment on the ground, while he commences the canter by raising his fore feet together.

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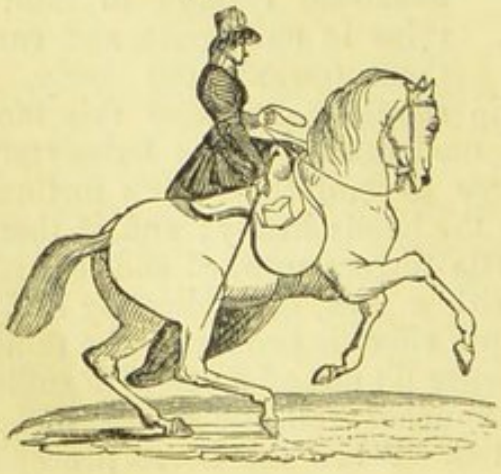

The canter (fig. 26) is the most elegant and agreeable of all the paces, when properly performed by the horse and rider; its perfection consists in its union and animation, rather than its speed. It is usual with learners, who practise without a master, to begin the canter previously to the trot; but we are supported by good authority in recommending that the pupil should

first practise the trot, as it is certainly much better calculated to strengthen and confirm her in the balance, seat, &c., than the canter.

The pupil is advised, at this stage of her progress, to practise the paces, alternately, in the various combinations of the figures we have described; performing her aids with greater power and accuracy in turning and working in circles, when trotting or cantering, than when walking. She should also perfect herself in her aids, the correspondence, and balance, by alternately increasing and diminishing the speed in each pace, until she attain a perfect mastery over herself and her horse, and can not only make him work in what direction, and at what pace, but also at what degree of speed in each pace, she pleases. She may extend the canter to a gallop, learn how to ascertain, by the motion of the horse, if his canter be false or true, and acquire the means of making him rectify his action. In cantering, the horse ought to lead with the right foot; should he strike off with the left, the rider must either check him to a walk, and then make him commence the canter again, or induce him to advance the proper leg by means of the near rein, pressing his side with the left leg, and touching the right shoulder with the whip. The hind legs should follow the direction of the fore legs, otherwise the pace is untrue, disunited, and unpleasant, both to the horse and rider; therefore, if the horse lead with his near fore leg (unless when cantering to the left, the only case when the near legs should be advanced), or with his near hind leg, except in the case just mentioned—although he may lead with the proper fore leg—the pace is false, and must be rectified.

THE GALLOP.

No lady of taste ever gallops on the road. Into this pace, the lady's horse is never urged, or permitted to break, except in the field; and not above one among a thousand of our fair readers, it may be surmised, is likely to be endowed with sufficient ambition and boldness, to attempt "the following of hounds." Any remarks, on our part, with regard to this pace, would, therefore, be all but needless.

STOPPING.

The pupil must also learn how to perform the perfect stop in all the paces. The perfect stop in the walk is a cessation of

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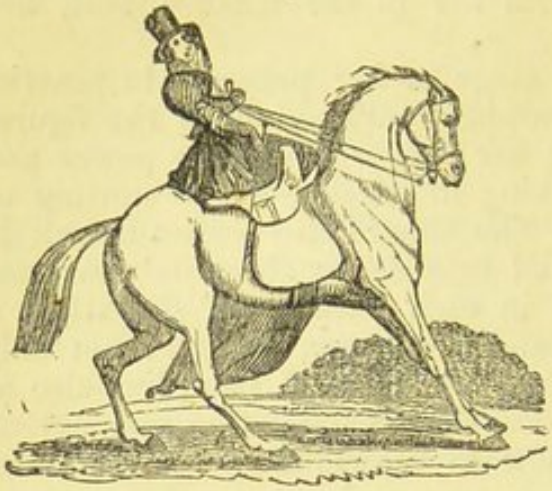

all action in the animal, produced instantaneously by the rider, without any previous intimation being given to the horse (fig. 27). The slovenly stop is gradual and uncertain; the incorrect stop is a momentary and violent check on the action in the middle, instead of the conclusion of the cadence: while its first part is coming to the ground, the proper movements should be performed by the rider, so that it may conclude correctly with the cadence. The firmness of the hand should be increased, the body be thrown back, the reins drawn to the body, and the horse's haunches pressed forward by the leg and whip, so that he may be brought to bear on the bit.

The stop in the trot is performed as in the walk; the rider should operate when the leading legs have come to the ground, so that the stop be perfected when the other fore and hind legs advance and complete the cadence.

The stop in the canter is performed by the rider in a similar manner: the time should be at the instant when the horse's fore feet are descending; the hind feet will immediately follow, and at once conclude the stop and cadence. The rider must bear in mind, that in order to make the stop perfect, the horse should previously be animated, united, and correct, in the beats or time of his pace. In an extended canter, or gallop, it is advisable to reduce the horse to a short trot, prior to stopping him, or to perform the stop by a *double arrêt;* that is, in two cadences instead of one. Stopping or turning too suddenly in the gallop, is very distressing to the horse, as well as unsafe to the rider; in fact, the pace itself is rather too violent and exceptionable, in many respects, for a lady to ride.

BACKING.

It is necessary that the pupil should learn how to make a horse back in walking; to do this, the reins are to be drawn equally and steadily towards the body (but yielded to him when he obeys), and his croupe is to be kept in a proper direction by means of the leg and whip.

The pupil should perform her first lessons with a snaffle bridle,

holding the reins in both hands, and without a stirrup. When she has acquired some degree of practice in the balance, aids, and general government of the horse, she may use a curb with double reins, and hold them in the left hand, managing them as we have directed in some of the preceding pages.

It would be well for the self-taught equestrian, who has not acquired the true principles of Riding, to go through all the foregoing exercises in the paces, patiently and progressively; she will, doubtless, find it difficult to drop her incorrect mode of riding; but she should persevere, if she wishes to sit her horse with grace, ease, and safety. The pupil, in all cases, should recollect, that her horse requires occasional haltings and relaxation; the time occupied in each lesson should be in proportion to the pace and animation in which it has been performed. If the exercise be varied and highly animated, the horse should rest to recruit himself at the expiration of twelve or fifteen minutes; when refreshed by halting, he may be made to go through another of the same or rather less duration, and then be put up for the day; it would be still better to make two halts in the same space of time; the exercise taken in such a lesson being equal to three hours' moderate work. When the lessons are less animated, they may be made proportionally longer; but it is always better, if the pupil err in this respect, to do so on the side of brevity, than, by making her lessons too long, to harass her horse, and fatigue herself, so as to lose her spirit and animation.

LEAPING.

In the riding-schools, ladies who never intend to join what the poets call the jocund pack,

> By copse or dingle, heath or sheltering wood,

are frequently taught to leap at the bar. The practice is beneficial, as it tends to confirm the seat, and to enable the rider more effectually to preserve her balance, should she afterwards be mounted on an unsteady or vicious horse.

Leaps are taken either standing or flying, over a bar, which is so contrived as to fall when touched by the horse's feet, if he do not clear it: it is placed at a short distance from the ground at first, and raised by degrees, as the pupil improves. The standing leap, which is practised first, the horse takes from the halt, close to the bar. The flying-leap is taken from any pace, and is easier than the standing-leap, although the latter is considered the safer of the two to begin with; as, from the steadiness with which it is made by a trained horse, the master or assistant can aid the pupil at the slightest appearance of danger.

The position of the rider is to be governed in this, as in all other cases, by the action of the horse. No weight is to be borne on the stirrup; for, in fact, pressure on the stirrup will tend to raise the body, rather than keep it close to the saddle. The legs (particularly the right one) must be pressed closely against the saddle; and the hand and the reins yielded to the horse, so that the rider can just distinguish a slight correspondence between her hand and the horse's mouth. The animations thus produced, and the invitation thus given, will make the horse rise. As his fore quarters ascend, the lady is to advance forward; the back being bent inward, and the head upright and steady (fig. 28, the ascent). As soon as the horse's hind legs quit the ground, the body is to incline backward, the rider taking care not to bear heavily on the reins, lest the horse force her hand, and pull her forward on his neck, or over his head, ashe descends. When the leap is cleared, the rider should bring the horse together, if at all disunited, and resume her previous ordinary position.

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In the flying-leap the seat is to be preserved, as in the standing-leap; except, that it is needless, and indeed unwise, to advance the body as the horse rises: because, in the flying leap, the horse's position, especially in a low leap, is more horizontal than when he rises at the bar from a halt; and there is great danger of the rider being thrown, if she lean forward, in case the horse suddenly check himself and refuse the leap, which circumstance occasionally happens. The waist should be brought forward, and the body suffered to take that inclination backward which will be produced by

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the spring forward of the horse. The horse's head is to be guided towards the bar, and the reins yielded to him as he advances. The proper distance for a horse to run previous to the leap, is from ten to fifteen yards. If he be well trained, he may be suffered to take his own pace at it; but it is necessary to animate an indolent horse into a short, collected gallop, and urge him by strong aids to make the leap. (Fig. 29, the descent.)

DISMOUNTING.

Having now conducted our fair readers through the leading principles of Riding—teaching them, as well as our humble abilities would permit, how to enjoy its pleasures, and to avoid its perils—it only remains for us to dismount them with grace and safety, previously to laying aside our pen.

The first important point to be attended to, in dismounting, is the perfect disentanglement of the clothes from the saddle: and before the lady quits it, she ought to bring her horse carefully to a stop. If she be light and dexterous, she may dismount without assistance, from a middle-sized horse; but it is better not to do so if the animal be high. The right hand, in preparing to dismount, is to receive the reins, and be carried to the off crutch of the pommel. The reins should be held sufficiently tight to restrain the horse from advancing, and yet not so firm as to cause him to qack or rear: nor uneven, lest it make him swerve. The lady should next disengage her right leg from the pommel, clearing the dress as she raises her knee; then remove her right hand to the near crutch, and take her foot from the stirrup. Thus far the process is the same whether the lady dismount with or without assistance. If she be assisted, the gentleman, or attendant, may either lift her completely off the saddle to the ground, if she be very young; or, taking her left hand in his left hand, place his right hand on her waist, and, as she springs off, support her in her descent (fig. 30). She may also alight, if she be tolerably active, by placing her right hand in that of the gentleman, who in this case stands at the horse's shoulder, and descend withold any other support. Should there be any objection or difficulty found in alighting by either of these modes, the gentleman or

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assistant may place himself immediately in front of the lady, who is then to incline sufficiently forward for him to receive her weight, by placing his hands under her arms, and thus easing her descent.

If the lady dismount without assistance, after the hand is carried from the off to the near crutch, she must turn round so as to be able to take in her left hand a lock of the horse's name; by the aid of which, and bearing her right on the crutch, she may alight without difficulty. In dismounting thus without assistance, she must turn completely round as she quits the saddle, so as to alight with her face towards the horse's side (fig. 31). By whatever mode the lady dismounts, but especially if she do so without assistance, to prevent any unpleasant shock on reaching the ground, she should bend her knees, suffer her body to be perfectly pliant, and alight on her toes, or the balls of her feet. She is neither to relinquish her hold, nor is the gentleman, or assistant, if she make use of his ministry, to withdraw his hand, until she is perfectly safe on the ground. In order to acquire the mode of dismounting with grace and ease, more practice is required than merely descending from the saddle after an exercise or a ride. It is advisable to mount and dismount, for some days, several times successively, either before or after the ride; commencing with the most simple modes, until the pupil acquires sufficient confidence and experience to perform either of these operations in a proper manner, with the mere help of the assistant's hand, and even to dismount without any aid whatever.

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H. Howard R.A.

Engraved by T. Englehart

MUSIC.

When Music, heavenly maid! was young;
While yet in early Greece she sung;
The Passions oft, to hear her shell,
Throng'd around her magic cell.

UNDOUBTEDLY, the most remarkable characteristic of the musical taste of the nineteenth century is the intellectual elevation which the art has reached. The love of music has become so universal, that few can be found honest enough to confess an indifference to it.

The principal qualifications necessary to the full enjoyment and appreciation of the highest quality of music, are, a good ear, a quick sensibility, and a refined taste. There is a kind of music addressing itself principally to the understanding, such as Canons and Fugues, or pieces of learned contrivance, practised by the old masters, which, however stiff and formal they may seem to modern ears, produced their effect: they led the way to coherence of ideas and symmetry of construction, excellencies which in later days have been so admirably developed in the compositions of Mozart, Haydn, Beethoven, and Mendelssohn. To enjoy the masterly works of these authors, should be the ambition of every student. When

we mention the value of a good ear for this purpose, it may perhaps, excite a smile, that a quality so obvious, should be alluded to here ;—a little reflection will, however, convince even those who have made some proficiency in the practical part of the art, that the observation is not beneath attention. A child who catches up all the tunes it hears manifests that strong musical predisposition which, later in life, secures the ear from being injured by the many wrong notes, or passages too flatly or sharply sung, which vitiate more imperfect organs. The habit of allowing an ordinary ear to accommodate itself to anything out of tune, is highly mischievous ; for though it may not destroy the whole pleasure to be derived from music, it blunts the fine edge of enjoyment ; and it is astonishing how many public performers are defective in this particular. While, therefore, the first species of ear may be left to itself, the second should receive care and education : for the neglect of comparing sounds, and of examining the nicety of intervals, in youth, produces, at last, that thorough obtusiveness to music, which is often discoverable in persons of a middle age. Those who are conscious of any defective intonation in singing, should take pains to rectify it, and not come to the hasty and despairing conclusion that nature has withheld from them certain faculties. Untuned piano-fortes, and a random way of using the voice, without proving the truth of the intervals, lead, at last, to a total depravity of the ear. Madame Malibran and Mademoiselle Sontag, the famed opera singers, exhibited a perfection, with respect to exactitude of pitch, in their singing, which had been scarcely before heard in England ; and such was the impression created by their performance that the propriety of training the ear, as well as the voice, ceased to be a matter of doubt. The piano-forte is both the grammar and the treasury of music, and its present state of perfection and facility of acquisition brings music to every home, from the palace to the cottage.

As all those who would be good players should be acquainted with the best styles of singing, it is of great advantage to a vocal performer to be well initiated upon a keyed instrument : this leads to a knowledge of modulation, and relish for harmony ; in a word, it ensures the confidence of science, without diminishing the natural feeling. It would be no difficult task to show that those singers, who trust to unassisted nature, are apt to fall into vulgarity : a mere ballad may certainly be thus achieved ; but in higher attempts, the mind and uncultivated taste of the performer must appear. Indeed, whatever may be said of genius and natural aptitude for music, it may be asserted, that nothing admirable was ever accomplished, by composer or performer, without great patience and the most persevering application. Buffon has

truly remarked of this talent for study, that it is in itself genius ; and careful study, that is to say, not the mere routine of mechanical exercises for the fingers or voice, but a steady practice, in which the head directs the labours of both, is more frequently wanting among us than musical feeling.

The first requisite for a pupil is a good master. A self-taught performer, however talented and sucessful, can rarely, if ever, attain that high finish which betokens the *coup de maître*. Much depends upon attention to minute points in the outset of the study of piano-forte playing; for injudicious instruction at this period produces the worst consequences.

The position of the pupil's hand upon the instrument, and the motion of her fingers, require especial attention ; for the foundation of a bad and indistinct execution is frequently acquired by those who are diligent enough in practising, but have not been well directed in the outset. Nothing is more common than to see four or five keys in the playing of a scale, held down at the same time, and that even by young ladies who read music with great facility. This violation of harmony, intolerable to well-regulated ears, results from want of attention to the preliminary exercises. Difficulties in the practical part of music have, of late, so much increased, that none but those who have received very early instruction can hope to emulate the brilliancy and articulation of a Moscheles, Thalberg, Hallé, Sterndale Bennett, or Arabella Goddard. The music and passages of some modern piano-forte composers, however, are not worth the trouble of conquering; and though early youth is to be recommended as the season for undergoing the process of strengthening the hand, and rendering the fingers independent, it should be with a view to the beautiful and intelligible compositions of Dussek, Handel, Sebastian Bach, Haydn, Mozart, Beethoven, Hummel, Mendelssohn, Weber, and other great composers ; and not for the sake of the ordinary parade pieces.

As the taste gradually forms, and the pupil becomes acquainted with a succession of good authors, it is of the highest importance that, in the choice of pieces, the real piano-forte style should be preserved; and that flimsy extracts from operas, ballets, &c., should be avoided. Diligent attention at concerts, and observation of the manner of fine performers, are efficient means of improvement. In Cramer's celebrated piano-forte studies—indeed in all that he has composed—is to be found deep knowledge of harmony, joined to exquisite melody of the most fresh and natural vein : but the great excellence of his productions is, that they are calculated to display all the effects which are peculiar to the instrument. The piano-forte works of Hummel unite the excellencies of Cramer and Moscheles : that is, they present all the

smoothness and harmonious blendings of intervals of the one, with the bold extensions and abrupt *arpeggio* passages of the other.

Supposing the pupil to have attained a pretty good execution, it may be proposed that the studies shall be finished by this progression of authors :—Mozart, Clementi, Dussek, Beethoven, Mendelssohn, and the difficult productions of distinguished composers, ancient and modern. If any would still proceed and form a taste for the loftiest departments of the art, the works of Handel and Sebastian Bach form the proper termination. It should be strongly impressed upon the mind of the student, that what is attempted should be well executed; and that it is better to stop short half-way with a neat and rounded execution, than to risk great difficulties with a lame or heavy finger. As the time of many young ladies is claimed by other accomplishments as well as music, it may be proper to remind them, that the greatest labour does not always secure a pleasing performer. As an instance of the effect of strong natural taste, we will only mention, that we have heard some of the andante movements of Haydn's sinfonias played by a gentleman whose abilities in fingering would never help him through a scale, yet so just was the expression of this amateur, so finished his embellishment, and so delicate his touch, that, in the result, it appeared as though a professor were at the instrument. Part of the false taste which has been introduced by popular singers and performers into the music of the present day, is a capricious dragging of the time (*tempo rubato*), from a notion, which is the very reverse of truth, that an adherence to time destroys expression. Mozart has well combated this error: he distinctly states, in his letters, that time is the most difficult and necessary part of music, and he prides himself upon always being accurate in it. It is not necessary that the mechanical process of counting and beating should be remarkable in performance; a good master will encourage the habit from the first, and the student will find, that to mark the proportions of rhythm soon becomes an involuntary action of the mind.

The incautious use of the pedals should be guarded against, not only because the sounds being sustained, irrelevant harmonies are often heard in confusion, to the annoyance and injury of the ear, but because this scheme for covering poor execution by noise, is now generally understood; or if such be not the interpretation, the frequeut employment of the pedals is, at least, set down to bad taste. Mozart and Clementi, who were among the most finished and expressive of performers, needed no aid of pedals to heighten the effect of their compositions and execution.

At the same time that the fingers are trained, the eye accustomed to prompt service, and the ready answer of the hand

ensured by the practice of *new* music at frequent intervals, it is expedient that the pupil should be acquainted with figured basses, and the inversions and roots of chords. This study, which is called Thorough Bass, has, we know, a frightfully harsh sound in ladies' ears; but it is really so simple and trifling, compared with the drudgery of musical practice, that we can only compare the acquirement of this knowledge to learning a common rule in arithmetic. Several books* explain so concisely the elements of this musical short-hand, that no one who take the trouble to read will complain of having been decoyed into unnecessary trouble. Thorough Bass, it is true, leads a little way into the science of composition, but not into any of those abstruse parts, the comprehension of which, depending upon innate propensities, would of course make any attempt to explain them to the general learner absurd.

Under the direction of a competent master, the steady and careful pupil, possessing ordinary intelligence and faculties, will certainly reach correctness of performance. This point gained, the next endeavour should be to understand the intention of a composer;—to feel out the just degree of force to be given to any emphatic note or group of notes;—to diminish and increase the sound in proper places;—to discover melodies in the bass and inner parts as well as in the treble;—and, lastly, to see, in the mind's eye, all the symmetry of structure in a composition. This taste is to be acquired, but its acquirement will be slow in those cases where the pupil plays continually alone; while it may be greatly facilitated by playing, in small parties, such music as the sonatas of Mozart with accompaniments, Beethoven and Mozart's symphonies, or Mozart's concertos, of which excellent arrangements by Novello, Watts, Hummel, Czerny, and others, are to be obtained. These contain the purest harmony, and are greatly preferable to popular fantasias, which, from their irregularity, are trifles in the estimation of composers, and, by their licentious combinations, essentially injure the ear. It is wise to lay as good a foundation for raising the taste, as for the mechanism of execution. When the judgment has become settled, and the natural resolutions of harmonies fixed in the mind, we may listen to the wildest effusions of eccentric composers, and even be amused with their novelty, without our principles being disturbed. National melodies, provided their character be faithfully preserved, are useful and agreeable; but the generality of vocal pieces, such as Troubadour Airs, Lays

* Burrowes, 'Thorough Bass Primer,' 7s.; Albrechtsberger's 'Methods of Harmony, Figured Bass, and Composition,' 10s. 6d.; Czerny's 'Thorough Bass and Expression,' 4s.; Hamilton's 'Catechism of Harmony and Thorough Bass,' 2s.; and many others, as may be seen in the Music-sellers' Catalogues.

of Minstrels, and the like, should be rather condescended to than encouraged; for though we are bound to humour the fancies of our friends, we must be cautious that a little smooth harmony, or trite melody, do not impose itself upon us as the consummation of art, and that our own taste, instead of making advances, does not retrograde. From thoroughly bad music there is nothing to fear; we question whether it may not sharpen the relish for good authors; but mawkish middling compositions, when frequently listened to, are decidedly insidious and hurtful.

VOCAL MUSIC.

It is a mistake too general among amateurs, that, as singing is in a manner giving vent to the feelings, unaccompanied by any visible mechanical operation, they should make the ear their sole guide; with such, science is superfluous and practice unnecessary. That those are best calculated to succeed as singers, who have great liveliness of ear, accompanied by a musical memory, there can be no doubt; but it sometimes occurs, that such natural advantages are obstacles to perfection.

A course of practice on the piano may be accomplished before the *solfa* is commenced; but though desirable, this is not absolutely necessary, and many of the most celebrated singers have been more governed by their ear than their exact knowledge of music, and have been unable either to accompany themselves or sing their parts at first sight. How much has that word science, with regard to singing, been abused! We have heard it attributed to the vilest flourishes upon wrong harmonies, and to many other absurdities upon which the theatrical public no longer waste their applause. The vulgar graces and so-called embellishments, copied from the theatre, and heard at second-hand in every drawing-room a few years back, made sound judges despair of the success of music in England. Even of professional singers, the education has, in England, been hitherto extremely superficial, and it is not surprising that the pupils of such masters should be scarcely better informed; a fine voice being generally regarded as ninety-nine points out of a hundred, all that the master did to fit his pupil for the public, was to strengthen it, to teach a shake, a few cadences, and half a dozen parts in operas, by the labour of infinite repetition. The pupil then, knowing no more of harmony than the chords which accompany the scale, and those upon no certain principles, became instructor in his turn, and daily thought himself fulfilling his duty to parents, by teaching their children the turns and graces to a few fashionable songs. Indeed, ignorance of music is still but too prevalent among singing-masters, so that

it is vain to expect from them a fundamental and systematic course of instruction. There are, however, many and splendid exceptions.

We would not have any of our readers repress an inclination to the study of singing from diffidence on the score of voice: daily practice will almost create a tone where none existed; and, after all, if the defect of quality can be compensated by feeling and good taste, it will delight infinitely more than those powerful voices which, in unskilful performers, are perfectly overwhelming and disagreeable.

A radical defect of ear is, then, the only real objection to the cultivation of singing, since voice may be acquired by artificial means, that is, by exercise well directed; and as it is impossible that a true love of music can exist without a fondness for vocal melody, we hope to be rendering a service to our fair readers by showing them how easily, without extraordinary natural gifts, they may please themselves and others. Want of judgment or self-appreciation is the cause why private performances often displease; and those who follow a prevailing fashion in music, without considering their natural inclination, or how far their voice or their accustomed practice may have fitted them for peculiar imitation, generally excite disadvantageous comparison. This is never the case with any who sing what they feel strongly impelled to. In the first place, we would have the natural compass strictly adhered to, and thus all those forced, harsh tones, which generally lead to the utter ruin of the voice, will be avoided; no mezzo-soprano should be allowed to scream up to C, or a high treble descend to A; we would have no sweet-voiced placid girl attempt a scena that demanded the impassioned declamation of a Pasta in Medéa; —nor any, excellent in a ballad, attempt very difficult variations, to remind us of the perfect articulation of Mademoiselle Sontag. Few have the discrimination to select that species of music which is perfectly accordant with their disposition, as well as within their powers; and it is notorious in public singers, that many have gone through part after part without any decided success, who have at length gained it by a casual experiment.

Remembering the natural limits of the voice, the diligent student should unremittingly follow up the practice of the *solfa*, beginning piano, swelling out the voice and diminishing it again, in as long notes as a judicious economy of the breath will allow; making exactness of pitch and intonation the subject of vigilant attention. The tendency of the voice is to sink, especially after fatigue, and the performer is less likely to be aware of such accidents than the audience. When it is remembered how exquisitely delicate is the structure of the organ, and that its intonation is liable to

be injured by the slightest agitation of the spirits, or nervous dread, to which the best singers are subject in performing before certain companies, little need be said on the necessity for care in the outset. Previous practice on the piano-forte will greatly quicken the improvement, and render the acquirements solid; and an instrument always kept in the perfection of tune, must be the standard of truth, and the umpire between the ear and the voice. So much, with respect to compass and tone, depends upon the general health, that the scale will be often lengthened or curtailed several notes, in proportion as it is good or bad; but as it is injurious at any time to fatigue the voice by over-application, it is especially so to exert it, at particular times, to reach extreme notes with difficulty.

After daily practice of the scale, and the attainment of readiness in hitting distances or intervals, it will be highly advantageous to the young performer to take the lower part in duets, or the middle voice in trios: this prevents too great a reliance being placed upon the upper melody, facilitates the reading of music, gives confidence, and forms a good preparation for singing to the accompaniments of modern music. The voice should, as quickly as possible, divest itself of the assistance of those go-cart and leading-string accompaniments, by which popular song-writers enervate the taste, and destroy the capacity for improvement; for if the pupil be well accustomed to read and to keep time, it matters little what goes forward on the instrument or in the orchestra: and here, instead of a barren accompaniment, with the melody in unison with the voice and helping it all the way, we may have our enjoyment doubled, in listening to the fancy and ingenuity of the composer, as they are employed in setting off his prominent subject. There is a strict analogy between the light and shadow and the other resources by which an historical painter draws attention to his principal figure, and the use of varied accompaniments to a grand air: they are, doubtless, to be used with discretion, but we cannot listen to the beautiful phrases in Mozart's accompaniments, or to those in Beethoven's Cantatas, such as his "Ah! Perfido," and persuade ourselves that they injure vocal melody.

All that we urge tends to this—that neglect of laying a foundation of musical knowledge, and too great dependence on the feeling or ear, hinder many from becoming fine performers; and these errors, therefore, cannot be too zealously combated. In the once celebrated Mrs. Billington, there was an example of the wonderful effects produced by industry and cultivation, upon natural genius. This lady was as fine a piano-forte performer as a singer, but she had the good sense to keep the knowledge of her skill in the back-

ground; because she knew that the public would not believe such a phenomenon of perfection, in all the styles of vocal and instrumental music, could possibly exist; and that, as she showed excellence as a player, the public would detract from her merits as a singer. One instance of the talent of this extraordinary woman is worth recording. Mrs. Billington proposed to bring forward, for her benefit, Mozart's Opera, La Clemenza di Tito, which had never been heard in this country, and of which there was only one manuscript score in the kingdom. The whole band, the singers, and chorus, were anxious to hear the contents of so precious a novelty, and Mrs. Billington gratified them by sitting down to the piano-forte, playing the accompaniments from the score, and singing the principal part—that of Vitellia. In this way she went through the whole of the opera, from beginning to end—giving Mozart's expression and character so admirably, *at sight*, that the audience were in a state of enthusiasm no less with what they heard, than with admiration of her wonderful powers, and fine musical mind. Madame Viardot is similarly accomplished, as was shown in her rehearsal of the Prophéte, at Covent Garden. If industry, and knowledge of the mechanical part of music, were the means of perfecting a Billington, or a Viardot, we may conclude, that they are equally calculated to make the most of the poorest voice. Students should not become impatient of practice, because the tone does not flow freely, or appear of a good quality, during their first attempts: such is the case with every unused instrument—every violin not played upon, or flute not breathed through; but perseverance in the rules of art will soften imperfections and correct defects.

The influence of the temper upon tone deserves much consideration. Habits of querulousness, or ill-nature, will communicate a cat-like quality to the singing, as infallibly as they give a peculiar character to the speaking voice. That there really exist amiable tones is not a fanciful chimera. In the voice there is no deception; it is, to many, the index of the mind, as well as of moral qualities; and it may be remarked, that the low, soft tones of gentle and amiable beings, whatever their musical endowments may be, seldom fail to please; besides which, the singing of ladies indicates the cultivation of their taste generally, and the embellishment of the mind. Shakespeare felt that there is a reciprocal charm reflected from music on the singer, and from the singer on music, when he wrote that beautiful comparison of the sound of a loved voice to

> Ditties highly penned,
> Sung by a fair queen in a summer's bower,
> With ravishing division to her lute.

The voice is, to some extent, a matter of imitation, witness the local expression which prevails in some parts of America, as well as in our own provinces. For an instant, compare the vulgarity and repulsive tone of voice of a ballad-singer to the manner of an equally uncultivated singer in good society; or watch the treatment of a pretty melody from the time of its first singing at an opera, or a concert-room at the west-end, until it reaches the streets, and observe how it gains something new of vulgarity with every fresh degradation: the discrepancy between the copy and the original air becomes, at length, ludicrous.

Where several young ladies, sisters or friends, reside in one family, there is an opportunity for bringing the social harmony of voices to a kind of perfection, which casual intercourse can never lead to. In a country life, the accomplishment of music is especially graceful. What can better befit morning or evening society in an arbour, or in the shady recesses of a park or pleasure-ground, than an Italian arietta, aided by a few *extempore* touches of the guitar? A social glee, sung by heart, may not render the amusements of the needle less interesting, or ill occupy the interval of reading aloud. One of the chief delights of ladies' work is, that it so little engrosses the thought: while her fingers are mechanically employed, they may, in a hundred ways, entertain themselves, and those about them, with the music of their voices.

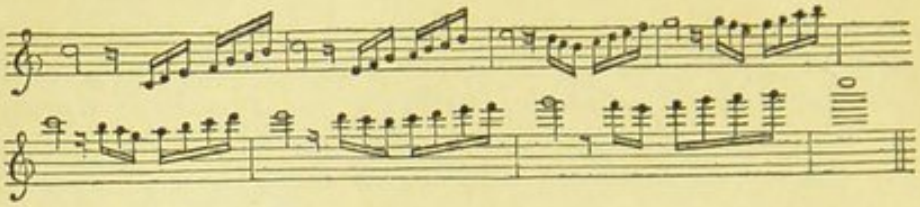
To resume our practical hints;—as it is necessary that solo singing should have a considerable degree of polish in the execution, we would recommend the young pupil to the choice of slow and expressive airs of the old Italian school, as the best to initiate the voice. A close and brilliant shake is so necessary an ornament to some styles of vocal music, that the frequent practice of it (taking care that it be very slow at first, and quickened by degrees) is advisable. But avoid any attempts at brilliant passages, or show songs, until your *solfeggi* have put it in your power to accomplish them with ease and distinctness. The public, from the time of Farinelli downwards, has consented to applaud divisions; and, to a certain degree, the study of them is advisable, as they give fluency and power in dramatic music; but arpeggio passages, like the celebrated variation to Rode's air, so inimitably executed by Mademoiselle Sontag, Madame Alboni, and Miss Louisa Pyne, should not be attempted in an early stage of progress, nor until the ear has attained the nicest accuracy.

Expression is the principal and characteristic charm of the voice, but propriety of expression demands fitness to a particular style; for instance, nothing can be more disagreeable than to hear Italian Opera music sung with the frigidity of the English style, except it be to hear a native ballad overlaid with foreign orna-

ments and frippery. A thorough acquaintance with the Italian language, and diligent observation of the best performers at the Opera, are to be recommended to those whose taste leads them in that direction; for it is in vain to think of giving, even in private, the spirit of Opera music, from the mere notes, sung with an inflexible face. Opera music, without the requisite warmth of manner, becomes incongruous, if not an elaborate absurdity. Conceive the sly, impertinent address of the knavish Leporello to Elvira, "Madamina" (in Don Giovanni), given with all the gravity of visage which a churchwarden wears at a parish-meeting; a portrait, however it may appear exaggerated into caricature, is not without an original. To succeed perfectly in such music as the airs of the Beggar's Opera, and the well-known Scotch and Irish melodies, of kindred simplicity and pathos, demands, generally, a voice of great native beauty, and a refined and tender soul. The impetuosity, which well befits the Italian style, is no profitable qualification for this department of vocal music. Handel's oratorio songs require, principally, a smooth, beautifully toned voice—the utmost conception of the devotional feeling of the composer—a beautiful *crescendo* and *decrescendo*, and a perfect shake. Perhaps there is nothing in music which approaches so nearly to our imagination of the angelical, as the tones of a beautiful female voice in some of the prayer-replete songs of Handel.

Whatever the flexibility which the practice of the succession of notes called the *roulade* bestows upon the voice, it is requisite that the time for displaying it should be regulated with judgment; for one of the most frequent, but least tolerable offences in singing, is to break the continuity, and injure the sentiment of a fine air, by its ill-timed introduction. Rapid and distinct articulation is never misplaced in a bravura; and the judicious performer will always select such movements as will place the acquirements in the most favorable light. The famed singer Signora Guari, at the time that Mozart, then a youth, was travelling through Parma, and creating the liveliest astonishment by his compositions and performance, invited him to her house, and sang to him some airs, which, though not of that kind most calculated to charm such a musician, excited his admiration to so great a degree, that he wrote down some of the passages she executed, lest his account should be deemed incredible. It is recorded by Mozart, to add to our surprise, that the higher the notes ascended, the softer the singer gave them; which is exactly the reverse of what is usually to be remarked in such exhibitions. The following extract from one passage of the bravura, sung on this occasion by Signora Guari, is an example of the florid in its proper place, and a lasting

monument of the capacity of the human voice in its highest stage of improvement:



We have but a few words more to say on the mechanism of the voice, before we recommend the pupil to her diligence. Let the words be well pronounced, and the tone flow directly and deeply from the chest, without receiving the slightest taint or peculiarity of quality from the head or throat in its passage; this is a point upon which some of our most celebrated English singing-masters have shown great negligence; it will, therefore, be prudent to choose such a teacher as has already made good pupils.

In order to found the taste upon the principles of a purely vocal style, we must turn to those treasures of melody which are discoverable in the Italian and German operas of such composers as Gluck, Paesiello, Cimarosa, Mozart, Meyerbeer, Bellini, Donizetti, and Mercadante. Rossini is among the most favorite of the authors usually put upon the music-desk; but though he has composed many exquisite pieces, some are too full of novelties and surprising passages to be safely placed in the hands of the tyro.

The province of vocal melody is but ill-fulfilled when the sounds penetrate no further than the ear; but sufficiently so, when they convey some emotion, from one human being to another, agreeably to the nature of the expression which the poetry or sentiment requires. It is highly interesting to trace the operations of the musician in characters of a mixed expression, as in the poor mad Nina of Paesiello; or where several persons of different characters are brought into one piece to contrast with and relieve each other, as in the celebrated quartett of Il Don Giovanni, "Non ti fidar." In neither of these compositions are the proper boundaries of the voice overstepped; though nothing can be more dissimilar than the melodies, yet each has the proper vocal character. However, there are some excellencies of singing which are certainly more worthy of attainment than others, and at the head of all may be placed the tender and pathetic. Certain singers are gifted with voices of a quality peculiarly fitted to affect in these styles; while others with a sweet and smiling tone can seldom make impression. The pupil must, as we said before, be greatly guided by inclination; but we would recommend that the approval or disapproval

of such music as "Che faro," in Gluck's Orfeo, or the duett "Deh prendi," in Mozart's Clemenza di Tito, should decide whether the musical sentiment is really strong in the hearer or not. The abundance of exquisite melodies which are to be found in the hymns to the Virgin, and other parts of the Catholic service, are calculated, next to these, to lead to great purity of taste; they are slow and graceful in the movement, and require that nicety of swelling and diminution of tone which indicate feeling.

OF MUSICAL STYLE, EMBELLISHMENT, &c.

The use of graces and minor embellishments is one of those results of a well-directed taste, the nice application of which produces style in performance. In all the compositions of the solid masters, Haydn, Beethoven, Mozart, much is left to the imagination and feeling of the performer; for it has been justly supposed that the writing of every individual note, and the marking of every transient shake or beat, would lead to so mechanical a style of execution, that melody would become tame and poor, and being destitute of all warmth in the manner of the player, would never reach the heart of the hearer. It partly accounts for the popularity of Rossini, that he was the first who wrote embellishments to his melodies at length, thus putting it in the power of many, who had neither imagination nor sensibility, to imitate those qualities in others. The distances in a melody are rendered so much more smooth and elegant by the turns, appogiature, and other graces resulting from a refined perception, that the use of them is indispensable. The player must be thoroughly acquainted with the character of the music she performs, or it is impossible that she can awaken those feelings in her auditory which the composer intended to excite; and the same rule applies equally to the singer. Every kind of movement, whether an allegro, an adagio, or a simple minuet, has its peculiarities, and the same embellishments cannot be used in common between them; for those which may be beautifully applied in one place, become in another absolutely injurious. The principle of the best masters of composition will serve here as an excellent guide to the student; they never repeat a phrase of melody harmonised in the same manner as they gave it at first; therefore, when ornament is most necessary, it will be generally found to be on the recurrence of a musical phrase. An over-anxiety to give the highest possible finish to a composition has led many into the very evil of tameness and want of effect that they wished to avoid; coolness and confidence are necessary here to temper the warmth of our fancy; indeed, the conflicting

qualities of an ardent feeling and sober judgment are so seldom found to exist in any but those of great experience, practice, and command of mechanical power, that we should advise a very slow and cautious progress in the formation of style.

We will suppose the harp or piano-forte performer to have attained all that skill which ensures correct performance; the next degree of excellence is to round off what may, by too great abruptness, seem sharp and angular, to suit the style accurately to the species of composition, and to add whatever is required of the tasteful or ornamental. This is by some termed beautiful performance—as distinguished from the expressive—but the line of demarcation is hardly perceptible. Expression, says an eminent authority, relates immediately to the feelings, and denotes in the player a capacity and facility of displaying by his performance, and urging to the heart of his audience, whatever the composer has addressed to the feelings in his productions, and which the performer must also feel after him; points which can be intimated only by general terms, having but little precision in them, and which usually are of service to those only who have these things already within them.

Beauty of performance, though much that relates to it may be explained by general rules, is too closely connected with the expressive to be taught or acquired perfectly. In proportion as a master is exquisitely alive to the beauty of song, it becomes difficult for him to say conscientiously to his pupil, "make this or that singer your model;" if such could be done, piano-forte players, harp players, and singers, might greatly shorten the road of their studies; but, unfortunately, though the pure vocal style contains the soul of music, the idea of melody is a much purer essence than can be found in the practice of the best singer existing. The pupil must form that for herself, from her own observation and feeling, of which she has no copy. The comparison of a great composer's most frequent phrases, and of their general expression, will serve to show what he most valued; and the agreement and variation of the eminent musicians of all nations and times will form a tolerable standard of musical beauty, yet still there must be a capacity for feeling that beauty. Rules, though here indeterminate, may be useful, and, at the least, protect from glaring error. The *allegro* must be characterised by the brilliancy and energy, resulting from strength of the hand and elasticity of the fingers; it must be strongly defined in its principal features, and whatever melodious passages may occur, they must not alter the time so strikingly as to leave the nature of the movement in any doubt. The delivery of the *adagio* is directly opposed to that of the allegro; for here the notes, instead of being crisp and brilliant,

require to be well sustained, and the intervals well connected, in imitation of the most polished vocal style. In this movement it will be especially requisite that there should exist the acutest sensibility in the fingers themselves, extending to the very tips, that the necessary pressure may be given with the minutest accuracy, and that the contact may be varied from delicacy to force at pleasure. The embellishments introduced in this style must be sparing, that the solemnity and purity of the melody be not overloaded with finery, and vulgarised; those that are used should be more slow and collected than in the allegro, and the whole should be marked by greater effusion and tenderness.

In music, the principal beauty rests upon two grand points; continuity of tone and swell; and where these are defective in the nature of instruments, art must supply them. How much a poor, monotonous harmony contents the ear, when the gradations are beautiful and delicate, we may note in the instance of the Æolian harp, which, moved by the wantonness of the passing gust, is listened to with pleasure, though it repeat nothing more than the same sounds; and we may observe how continuity and flow of sound stand instead of expression in the tones of an organ, where, though there be no augmentation or diminution, we cannot help being affected by the mere quality of the sound. When, then, we hear a fine composition, finely played on a fine instrument, we have a very unusual conjunction of favorable circumstances.

A concert room is, perhaps, the best place to acquire a relish for full harmony, and to understand the effects of light and shade in compositions, which cannot be comprehended but by a power of reading from score, or hearing the instruments as they are combined and placed in relief by the composer; but for *solo* pieces, and for getting into the heart of a good composition or style of playing, the private acquaintance of a fine performer is preferable. That state of formality arising from the consciousness of being under the gaze of the public, does not dispose either the player or singer to give way to the feelings; the daring attempts which often lead to perfection are not risked, where the consequences of failure would be more detrimental than those of success advantageous.

Perfect freedom from affectation is a great charm in performance, though it ought to be a negative virtue. The ordinary process by which players would indicate the great effect their author produces upon them is, nodding of the head, distorting and writhing of the body, lifting up of the hands, as though the keys were hot, with many other absurdities, which it would be well they could see in a glass.

In playing concertantes, or pieces with accompaniments, inde-

cision of time at the outset induces a wavering and uncertain manner throughout; it is tormenting to the listener, and increases the difficulty of the accompanying performers; it is, therefore, strongly recommended that the time should be well decided in the mind of the principal player before commencing. If the piece be of the bravura kind, let the movement be spirited, but not over-driven; for extreme velocity is generally resorted to as a covering for indistinct execution. In compositions of the sonata, or quartette species, in which the author distributes his ideas equally through all the parts, the hurrying of an allegro generally leads to the utter destruction of the character and clearness of the subject; for as Mozart himself observed, it is a mistake to think that rapidity of movement gives fire to the music; if the ideas themselves are deficient in it, quick playing will never supply it. The choice of time, or measure, in a composition, is indeed an exact criterion of the judgment, feeling, and taste, in a performer: nervousness, or hurry of the spirits, may sometimes occasion a miscalculation: but, generally speaking, nothing affords a readier proof of a musical mind, than excellency in this respect. Maelzel's metronome has reduced the time of modern compositions to a certainty; but pieces written before the invention of this useful machine, are all bequeathed to the careful consideration of the player; the vague Italian terms prefixed to them announcing nothing beyond the style. As a general principle, an error on the side of slowness of time is more tolerable than the contrary.

The art of accompaniment to vocal music is, though an unpretending study, a branch of practical music which requires the utmost nicety. So sensible was Haydn of its importance, that, when a boy, he paid his court to Porpora, an old, ill-tempered musician of great science; and endured hard words, interspersed with knocks, rather than miss the opportunity of his advice upon this subject. In vocal music, the piano-forte is to be completely subordinate; the accompanyist must attend upon the voice, and watch the singer in any little deviation from time; the effect of the fingers upon the keys must be rather felt than heard; and, except in a *ritornello*, or intervening symphony, the instrument must never be prominent. Some exception, however, is to be made in respect of operatic music, particularly of the German school, of which the instrumental parts from too remarkable a feature to be neglected, though great delicacy should regulate the execution of them. Coarseness and loudness of accompaniment, and a proneness to run about upon the keys, are in opposition to the fundamental maxims of this part of the science; but instances may be found, in which rules may be relaxed. When three or four voices are united, the province of the player is to render

assistance to any insecure or wavering performer; to be ready to prompt her with the note, yet so as not to expose her inefficiency.

Although the taste for melody and harmony is generally conjoined, yet, in some cases, the one will arrive at perfection, while the other remains very immature. To avoid this, there is scarcely a better mode than that of listening to fine recitative,—a part of dramatic music, in which Mozart, Gluck, and Cimarosa have left behind them specimens of perfect expression, and such modulation as cannot fail, when felt as it ought to be, to bring the taste to very great refinement. At the opera we may generally notice that the recitative passes off unattended to: indeed, modern composers are so sensible of the neglect bestowed upon recitative, with the old accompaniments of the violoncello and piano-forte, that they have almost abolished the use of them for the more noisy effects of the full orchestra; and sacrificed one of their most powerful contrasts to the impatience of ill-educated ears. Most people are sensible to the charms of a beautiful melody; but the taste for very exquisite successions of harmonies is of rare occurrence. We usually find, that the last attainment of a great singer is the true style of recitative, which, as it wholly depends upon the impression the chords of the composer make, may be considered a proof that the susceptibility to emotions from harmony, attends only an advanced state of the taste.

Having noted down some remarks which may be calculated to assist the progress of the student, from her first steps up to that point at which mechanical labour ceases to be useful, we shall revert a little to the earlier part of instruction on the piano-forte, to consider some of those errors which render acquirement of a smooth and rounded style of performance impracticable. Many a child, of excellent disposition for music, has been ruined as a performer, by being left too much alone in the outset, or too much to the superintendence of one who, with little ear, knowledge of time, or experience in teaching, suffers her pupil to practise waltzes, dances, and other little tunes, satisfied of the progress made, if the notes be expeditiously read and played. Sometimes a pupil is allowed to spend all her best time in learning to play popular tunes by heart, and after years of application wasted in this manner, is found at last to be almost ignorant of music, and scarcely able to play even the gamut lessons at sight. Parents are commonly too anxious to see results from the attendance of an instructor, and require to hear tunes by which alone they judge of their children's profit, and fondly anticipate all their future cleverness. Alas! these expectations are seldom realised. A good master, during the first year of his employment, is occupied in forming the hand, training the fingers, and beguiling, by a pleasant and

amusing manner, the unpleasing labour which is found at the beginning of music by all young and lively children; in whom to create an interest, and at the same time to repress the desire for getting forward, is not one of the least difficulties with which he has to contend. Without a thorough and gradual exercise of the fingers at the first, to render them equal in power, and capable of acting independently of each other, the advanced stages of execution will be indistinct and slovenly; the fingers will be seen either to dance upon the keys, or else to stick together and hold down more notes than are required; the wrists will be stiff, the arms full of motion, and the body awkward. The want of precision in counting time, ensues from neglecting it at first: so important is it to lay the proper emphasis in performance, that from the commencement of playing from notes, even while the pupil reads with hesitation, the master should count aloud. For the first half-year, and even, if possible, for the first entire year, every beginner requires one hour's daily instruction, because the pupil is at this time incapable of assisting herself, and if left too long alone will be injured by contracting bad habits; for every repeated mistake, or erroneous notion persisted in, causes infinite trouble to the master and pupil, even if it do not become permanent. The state of the piano-forte should be constantly attended to; it should never be suffered to remain out of tune, to the injury of the ear, and perhaps to the creating of a distaste for music. The earlier the pupil is enabled to tell the signatures of the keys, and the meaning of all the marks used in music, and accustomed to pay the most exact attention to them, the easier and more satisfactory will be the progress. As many changes as can be played without altering the position of the hands upon five notes, first separately, and then together, including double notes carefully articulated, will have excellent influence upon the fingers, and ensure a beautiful position of the hand and wrist. Whatever the lessons that are intermingled with the exercises of a beginner, they should not contain any harmonies of a complicated and unusual kind, which may leave the ear in doubt, and confuse the ideas of right and wrong: mistakes of this sort are common in elementary pieces, and lead to the consequence that false notes at length pass uncorrected.

The whole varieties of notes between the space of a sixth, seventh, and octave, should next be followed up unremittingly; taking care to let the weight of the hand incline rather on the thumb and first finger than on the third and fourth, which have enough to do to perform their own duty. The scales major and minor will succeed—first within the compass of an octave, then to a tenth and two octaves; next the chromatic scale in octaves,

thirds, and sixths, in similar and contrary motion; and the concluding exercise will consist of the scales, both major and minor, in thirds, tenths, and sixths, to be practised in the same way. The object of the modern system of training the fingers is to prepare them for all difficulties that may present themselves in the performance of sonatas or concertos—in fact, by anticipating every possible combination of notes, to remove difficulty entirely; and nothing is so serviceable to this purpose as early practice, while the hand is plastic, and the taste not too refined to endure constant repetition. If two fingers be found particularly attached to each other, so that one will not move unless the other do, care should be taken to exercise each separately, holding down all the fingers but the acting one, which must be raised and made to strike firmly, while all the others remain free from any kind of motion. A table, or any flat and hard surface, will serve equally well to break in the fingers as an instrument; and the pupil must observe that a pain in the wrist or up the arm is the signal to persevere, and not to leave off practice. The use of the thumb and little finger on the black keys is rendered absolutely indispensable by the style of writing at present in use; through this employment of them we are not obliged unnecessarily to pass the thumb under the fingers, or the fingers over the thumb, and in this manner we arrive, in many passages, at a more convenient, certain, and connected performance. The key, however, if in many sharps or flats, or otherwise, must determine the propriety of employing the fingering we have mentioned. In passages where the thumb and little finger are frequently placed upon the black keys, the white are to be struck, not in front of, but between the black keys; and in passages which lie altogether upon the black keys, the hand must be raised over them, and this new position considered as if the passage were to be played on white keys entirely.

One of the most beautiful effects of which the piano-forte is capable, is the distribution of chords in divisions *arpeggio*, a means of prolonging the harmony, and producing the charm of sustained sounds: the best masters employ the passage for this purpose, as may be seen from the preludes of Sebastian Bach; and it may be observed, with respect to chords generally, that instead of striking every note at once, the *arpeggio* has more expression and beauty, and should, therefore, be preferred. If the pedals be used at all—and some effects of combination are gained when they are judiciously introduced—it should be when the hand and eye have attained perfect certainty, and not before. The pupil should be early accustomed to point out those notes which require to be leaned upon, as also the division of the sentences and phrases in a com-

position, which practice will be found very beneficial to musical perception.

In the playing of passages of embellished melody in adagios, one of the greatest difficulties to the performer is to make the hands act independently. As the left hand is the basis on which the notes of embellishment are founded, grouped in various numbers, and without any regular distribution as to measure, it must preserve the time strictly. The player must also previously examine and compare the contents of all the bars, and select that which contains the largest number of notes of embellishment as the guide which must determine the quicker or slower performance of the rest. The beginning of a bar must be played rather slower than the notes which succeed, that the performer may not have to lengthen out the remaining part of a passage, in order to fill up the time; and that a chasm may never be left by miscalculation, and one part be concluded before the other. Embellished adagios, cannot be played without the nicest accuracy, and as these movements require to be executed with lightness, delicacy, and the utmost possible finish, they should be cautiously attempted; for the step from the sublime to the ridiculous is oftener exemplified in the adagio than in any other style of music. Generally speaking, an ascending series of notes should be played louder and louder by degrees, and when there is an imitation between the hands, both must observe the same expression. If, after a short note which takes place on the accented time of the measure, a longer note on the unaccented time should succeed, the latter usually requires an emphasis. When two notes are slurred together, the first must be marked by an emphasis, and the finger gently taken up from the key immediately after the second note is struck, and before its time has expired. Passages of dotted notes are generally played as if rests stood in the places of the dots; unless a slur should be drawn over several of them, in which case they should be held out their full time.

The piano-forte is seldom commenced at an age when the pupil can determine for herself what point of excellence it is desirable to reach, which must alone decide the degree of application necessary to attain the object. If it be merely a superficial accomplishment, proceeding no further than to the accompanying of songs, a few easy sonatas and studios will enable her to read with sufficient readiness to do this correctly. But it must be borne inmind, that whatever be the end proposed, the aim must be beyond it; for when a performer is placed to a composition which tries her powers to the very utmost, the effect is never pleasing to the hearer. Thus, the player of sonatas must aim at concertos in private; and the concerto performer at something more difficult.

for the having of force in reserve gives an ease and beauty to the performance, which an audience quickly distinguishes from laboured correctness.

At present there is scarcely a necessity for enjoining the study of the good masters; for the works of Beethoven, Haydn, Handel, Bach, Mozart, Weber, Mendelssohn, Sterndale Bennett, and other sound musicians, are making their way satisfactorily in the musical circles. Lectures and public performances are becoming common, and are generally well attended by ladies, to whom we would recommend that they take with them, on these occasions, the composition or score, and carefully observe the passages and particular effects. No means can be better adapted to shorten the long and laborious pursuit which is necessary to acquire taste in music, than lectures skilfully written and well illustrated; for they present the results of reading, experience, and observation, which the casual reader or student might draw but imperfectly if left to her own guidance.

Now that scores of the greatest works in music are becoming diffused, a source of delightful interest is opened to the amateur; those operations of the composer's mind, of which the combinations of the orchestra formerly left the hearer to a faint and unprofitable conjecture, may now be distinctly traced on paper:—the memory is no longer taxed to discover the correspondence of the parts; and as the author's design is unfolded, we derive new gratification from seeing its perfect symmetry.

Of late years, the fault of our instrumental music has been an extravagance of execution, which argued as pitiful an ambition in the player as want of intelligence in the hearer; for what must be the state of that musical mind that is satisfied with an exhibition of passages? As neither days have lengthened, nor the allowance of fingers been increased, since the rage for the wonderful in execution first infected the public, the malady has cured itself; for where mere labour could command the attention which was formerly bestowed on genius, the candidates were not likely to be few; the number of performers, who have succeeded in the dashing style, has, at length, brought the rattling of the finger-board into contempt. This sleight of hand, when used only as such, contributes to nothing but the vanity of the performer, and the debasing of the noble and intellectual ideas which it is the province of music to excite,—a style not at all incompatible with piano-forte music, as Beethoven and Mozart have shown us: we, therefore, most earnestly repeat, that execution is only commendable as it makes the meaning of the author apparent.

Instrumental music of the higher class of quartetts, and other models of pure and melodious writing, present, to a practised eye,

so much consistency and propriety in the consecution of ideas, that, by the habit of reading them, the good composer learns to detect, in any movement submitted to his inspection, a musical phrase misplaced, and with as much certainty as the judicious critic discovers an ill-constructed sentence in an essay. It is related of Beethoven, that on the first sight of a new composition, which was handed to him for his judgment, he pointed at once to a musical phrase, which he said was good in itself, but not good in the situation it occupied; and he then showed the place in which it would appear with the best effect. Haydn, also, grounded many of his slow movements on the incidents of some little plot which he had himself invented: and these authorities, we think, show that there is something to be received from instrumental music, beyond the merely vague sensations of elegance or tenderness, and certainly beyond that titillation of the ear, to which many debase this exquisite branch of composition. It follows, that if in works of established excellence we are unable to discover a meaning, we must rather suspect our own want of perception, than be hasty to condemn the dulness of the composer. Handel and Mozart, as dramatic musicians, speak for themselves to the hearts even of the most unpractised: the sacred words of the Messiah may indeed elevate our ideas of music, when we find that sentiment and expression can be so exalted and so perfect as in that great work.

The TRANSPOSITION OF PIECES from one key into another is not only a highly useful ability in the player, but one of the most improving studies in harmony that can be made. As those who undertake to accompany vocal pieces will frequently find that airs lie out of the compass of particular voices, and that there is a necessity for relieving them by a change of key, ease and certainty in transposing are an important object in practical music. The first essays should be made with simple and well-known tunes; altering them, from the original key, to some one not too remote, that the analogy be not wholly lost—from C to D, from E to E flat, and the like; and as these exercises go on increasing in difficulty, it will be found that the relation of harmonies becomes clearer to the mind, and that the knowledge of modulation *practically* is increased.

In conclusion, we would observe, that whatever time be bestowed on the cultivation of music, it should be with a view to enlarge our apprehension of the art in general, rather than to confine ourselves to one particular style or instrument, imagining that nothing beyond these is worthy of attention. The study of the piano-forte, which comprises, within the compass of a single pair of hands, as much of harmony as is necessary to enjoyment, offers the greatest facilities to the improvement of the musical mind;

and the amateur, who has accomplished sufficient variety of mechanical difficulty to play with freedom and ease, will find it more pleasing to extend her studies into the styles of masters, than to prosecute her practice on the piano-forte to a very high degree of perfection. A great deal of pleasure is lost by encouraging exclusiveness and bigotry of taste, which are ever attendant on a vulgar idea of music; but where we enter into the scientific principles of harmony, and distinguish the niceties in various styles of composers, our delight will be certain, and in strict proportion to the accuracy and extent of our knowledge.

DANCING.

DANCING.

PAS DE DEUX.

The song has ceas'd,
And young Rinaldo leads the lady forth
To dance a graceful measure on the turf.

MUSIC and Painting possess many advantages over the art on which we are about to treat; but in no point of view is their superiority to Dancing so conspicuous as in the zeal displayed by private individuals to attain the excellencies of the professional painter or musician; while, however highly the graceful movements of a first-rate public dancer may be admired, in society they are never imitated. It is usual, and doubtless judicious, to foster a talent for painting and music, and to push the pupil forward as far toward perfection as circumstances will permit; not with a view to the adoption of the art cultivated as a profession, but as being a valuable accomplishment in private life: the more difficult studies, and that kind of practice which leads to excellence in the art of Dancing, on the contrary, are seldom entered into, except by those who purpose appearing upon the stage. To emulate the master-touches of the painter or musician, is deemed meritorious in almost every class of society; the amateur who either wields the brush or touches the piano, adopts the same style, and occasionally rivals the execution of the professor; but public and private dancing are so exceedingly different from each other, that what may be deemed

a beauty in the one, would justly be considered a defect in the other: it is the ambition of the *artiste* to astonish and delight; the lady who joins in a quadrille aspires only to glide through the figure with easy and unobtrusive grace. A fine piano-forte performer is expected to play with equal spirit at a private party as in the concert-room, the musician's art being everywhere the same; but it would be in the extreme of bad taste for the ball-room dancer to attempt those brilliant embellishments to the "poetry of motion" which are displayed by the dancer on the stage. In former days fine dancing was deemed an accomplishment of first-rate importance; but at the present time, although every lady is expected, as a matter of course, to dance with ease and correctness, no one is permitted to be brilliant. Dancing has ceased to be a difficult and toilsome exercise, and is now softened down, as it certainly should be in society, to an agreeable pastime. It must not, however, be forgotten that the ease, grace, and neat execution which are looked for in ball-room dancing, can only result from diligent practice; without it, the pupil cannot expect to go through a quadrille with credit to herself, or comfort to those with whom she happens to be associated. The facility displayed by the accomplished should never lead her to imagine that perfect dancing is extremely easy of acquirement; due attention must be devoted to the preliminaries of the art, before any degree of ease and elegance are likely to be acquired.

For ages past Terpsichore has had innumerable votaries, and dancing will doubtless ever be a source of pleasure to mankind while graceful motion is admired. Various eminent authors have written in its praise, not merely as an accomplishment, but as a graceful and beneficial exercise: among its advocates in this country are Locke, Lord Herbert of Cherbury, Addison, and others of deservedly high reputation.

The great Locke, in his 'Treatise on Education' says—"Dancing, being that which gives graceful motion to all our limbs, and above all things, manliness and a becoming confidence to young children, I think cannot be learned too early. Nothing appears to me to give children so much confidence and behaviour, and so to raise them to the conversation of those above their years, as dancing."

Lord Herbert of Cherbury, to whom the world is indebted for some excellent remarks on the advancement of youth, states that those who have properly learned to dance appear to understand more what to do with themselves, and to have more freely and elegantly the use of their limbs, and command of their carriage, than others, who, labouring under a stiffness in their motions, seem as though they were without joints, and appear not to be capable either of sitting down, rising up, standing or walking, in a manner

agreeable to the eye of taste. He also observes, that those who have been taught by the more accurate dancing-masters, enter and quit a room where company is, and address themselves to persons, both above and below their own stations, with far more grace and propriety than those who have not had similar advantages.

In Fordyce's 'Sermons to Young Women,' the author observes that he can see no reason for declamation against the moderate and discreet use of dancing. "I freely confess," he adds, "that I am one of those who can look on with a very sensible satisfaction, well pleased to see a company of young people joyful with innocence, and happy in each other. If an exercise so sociable and enlivening were to occupy some part of that time which is lavished on cards, would the youth of either sex be the losers by it? I think not. It seems to me there can be no impropriety in it, any more than in modulating the voice into the most agreeable tones in singing; to which none, I think, will object. What is dancing, in the most rigid sense, but the harmony of motion rendered more palpable? Awkwardness, rusticity, ungraceful gestures, can never surely be meritorious."

Addison, in one of his papers in the 'Spectator,' says—"It may appear odd that I, who set up for a mighty lover, at least, of virtue, should take so much pains to recommend what the soberer part of mankind look upon to be a trifle; but under favour of the soberer part of mankind, I think they have not enough considered this matter, and for that reason only esteem it so lightly. I must also, in my own justification, say that I attempt to bring into the service of honour and virtue everything in nature that can pretend to give elegant delight. It may possibly be proved that vice is in itself destructive of pleasure, and virtue in itself conducive to it. If the delights of a free fortune were under proper regulation, this truth would not want much argument to support it; but it would be obvious that there is a strict affinity between all things that are truly laudable and beautiful, from the highest sentiment of the soul to the most indifferent gesture of the body. The business of dancing is to display beauty, and for that reason all distortions and mimicries, as such, are what raise aversion instead of pleasure."

Mrs. Chapone very justly remarks that dancing is now so universal that it cannot be dispensed with in the education of a gentlewoman; that it is, indeed, both useful and ornamental, as it forms and strengthens the body, and improves the carriage.

Many other passages, from the works of the wise and good in old times, as well as in our own day, might be adduced in favour of the Art of Dancing; it would, however, be needless to add to

the number, as enough have been selected to show the high estimation in which it has been held by writers whose opinions merit the utmost respect.

HISTORICAL SKETCH OF DANCING.

A slight sketch of the history of this agreeable art will, we doubt not, prove acceptable to our readers. This recreation, which, in modern times, is the delight of the youthful, was deemed worthy of notice, as an amusing and beneficial exercise, by many of the sages of old, several of whom were at once great philosophers and good dancers, and a few of them, even when far advanced in life, became pupils in the art. Timocrates first beheld an entertainment of dancing in his old age, and was so pleased with what he saw that he is said to have exclaimed against himself for having so long sacrificed such an exquisite enjoyment to the vain pride of philosophy.

It has been frequently stated by authors that music and dancing, as well as many other useful and ornamental arts, originated among the ancient Egyptians.

Among the Jews, dancing was practised at their religious ceremonies:

> Soon as the men their holy dance had done,
> The Hebrew matrons the same rites begun:
> Miriam, presiding o'er the female throng,
> Begins, and suits the movement to the song.

The Jews probably derived this custom from their ancient oppressors, the Egyptians; for we find that they indulged in it during their passage through the wilderness, shortly after their departure from the land of Pharoah. David danced before the ark; Jephthah's daughter is described as meeting her father with a dance; and one of the joys enumerated by the Prophet, when foretelling the return of the Jews from captivity, is that of the virgins rejoicing in the dance.

For the advancement of the art towards some degree of perfection we must look to Greece, where we find that music and dancing were cultivated in the earliest ages; and where the latter still seems to flourish, notwithstanding the thraldom in which the land has for ages been held: for we know that among the modern Greeks the passion for dancing is common to both sexes, who suffer nothing to deter them, when an opportunity occurs of indulging in its delights. Although the invention of the art is enveloped in fables, we have authentic records of its frequent early practice among the Greeks; and it probably attained to a considerable degree of refinement. They seem to have had three principal

kinds of dances,—*cordax*, *emmelia*, and *siccinis*, and, doubtless, numerous subdivisions: the first consisted of lively movements; the second was of grave and stately, bearing, probably, some resemblance to the modern Minuet; the third was a melange of the other two. Merion is extolled by Homer as a dancer; and it is related of one Hippocleides, that when he was about to be chosen from among a crowd of competitors, as the fortunate bridegroom of a fair virgin, he so incensed her father, by a foolish exhibition of his powers as a dancer, that the old man indignantly said to him, "Son of Tisander, you have danced away your wife!" The Athenians had a slow movement, which they danced at funeral processions, accompanied with solemn music. The old Spartans had a dance in honour of Saturn: they had another kind of dancing, termed the Phrygian, which was the step, or movement, they adopted when advancing to attack their enemies; and, according to Athenæus,[1] they had a law, by which their children were compelled to exercise themselves at the Pyrrhic dance, from the time they attained the age of five. Lycurgus instituted festivals of dancing in honour of Apollo; and it is even stated of the philosopher Socrates, whom the Delphic oracle had proclaimed the wisest of mankind, and who, as it is related, was a pupil of Damon in the art of music, that in his old age he actually received instructions in dancing from the accomplished Aspasia. Clarmidas, who caught him dancing one morning at his own house, upon the circumstance being mentioned by Socrates himself to disciples, observed, that he was so astonished at first, that he thought the philosopher's brain was turned; but that afterwards, when he heard the reasons given by Socrates for indulging in the exercise, he was so satisfied, that the first thing he did on his return home was to follow his example. At the funereal games, in honour of Patroclus, a kind of war-dance constituted one of the ceremonies; it is supposed to have been invented by Neoptolemus, the sons of Achilles. The Lacedemonians, the Cretans, and other nations, also had their war-dances; of these—which are called by the Spartans, the Pyrrhic dances—of the dance of the Bacchantes, and that of the Furies, Mr. Maurice, in his Indian Antiquities, gives the following animated description:

"The Greeks carried the sacred, as well as the social dance, to the highest point of attainable perfection. They made use of the varied dance, not only to animate devotion, but to excite valour and terrify guilt. The Pyrrhic dance of the Spartans was performed by youths, armed *cap-a-pié*, who brandished aloft

[1] See Bohn's 'Translation of Athenaus,' vol. iii, p. 1007.

their swords, and darted their javelins to the sound of martial music. The dance of the Bacchantes was more furious, accompanied by every sort of mirthful extravagance and furious gesticulation—shrieks, cries, and all the outward signs of violent agitation. But the most terrible of all dances was that of the Eumenides, or Furies, introduced on the tragic stage of Athens. The minds of the audience were agitated with dreadful alternations of passion, rage, anguish, and dismay: the valiant veteran, who had a thousand times braved death in the field of battle, trembled while it was performing; a great part of the sacred multitude rushed with precipitation from the theatre; and outcries of horror were heard on every side. The remaining audience, who had courage to witness the exhibition, appalled at the scenes which were acting, imagined they saw in earnest those terrific deities, the ministers of eternal justice, armed with the vengeance of Heaven, and commissioned to pursue and punish crimes upon earth."

The ancient Romans undoubtedly performed dances at their religious ceremonies, in the earliest ages. Numa Pompilius, in honour of Mars, ordained twelve dancing priests, called Salii, which number was doubled by Tullus Hostilius, in the war against Fidenæ, a town of the Sabines, so that the whole college contained twenty-four priests; who, habited in parti-coloured coats, with swords by their sides and javelins in their hands, occasionally danced about the city. A sort of dance, in some respects resembling the old English Morice Dance, was practised by the Romans; it was called Saltatio Mimicorum; the dancers wore silk corslets and gilt morions; they had bells affixed to their legs, and swords and bucklers in their hands. The young men, also, indulged in the recreation of dancing: they had chiefs, or captains, called Principes Juventutis, chosen from among the most noble families in Rome.

Perhaps in the earliest ages, but certainly in after times, individuals availed themselves of the benefits which the practice of dancing confers on the person and spirits. We find, that the guests of Scipio Africanus were entertained by the hero with dancing; and the younger Cato, the friend of Pompey, a man remarkable for gravity and austerity of manners, when above sixty years of age, practised this art, which he had learned in his younger days, as a graceful accomplishment. The name of Marc Antony is also enrolled among the votaries of this art at Rome; and we know that dancing was practised there at marriages.

As, among the ancients, dancing constituted one of the principal ceremonies in their religious festivals, it could not be suddenly abolished, on similar occasions, in those nations which were con-

verted, at an early period, to Christianity. According to Menestrier and Scaliger, the solemn dances of the Romans and Hebrews were performed by the dignitaries of the Church, in the time of Constantine. The latter author asserts, that the early bishops were called Præsules, because they commenced the dance in solemn festivals. The choir, or place where the canons, &c. in our cathedrals are placed, is clearly derived from a Greek word, signifying a company of dancers. Menestrier informs us, in his work on Ballets, published near the close of the sixteenth century, that he had seen the choristers and canons, on a Whit Sunday, dance while they chanted hymns of rejoicing. Gallini states, that not long ago, at Limoges, the people used to dance the round in the choir of the church, which is under the invocation of their guardian saint; and, at the end of each psalm, instead of the Gloria Patri, they sung as follows: "St. Marcel, pray for us, and we will dance in honour of you." In Spain, up to a very late period, if the custom do not even still exist, dancing was practised in the churches, on great festivals; and in a distant part of Wales, it is related, that within the memory of the present generation, the people were played out of church on Sunday, with a fiddle, and joined in the jocund dance in the church-yard, at the conclusion of the sermon.

In France, the year 1581, during the reign of Henry the Third, a splendid ballet was produced, under the auspices of the king, on the marriage of the Duc de Joyeuse to the queen's sister. The queen, also, gave a superb fête, at the Louvre, in honour of her sister's nuptials, in which a ballet was exhibited, called Ceres and her Nymphs; of which the music was afterwards published by the celebrated Piedmontese performer on the violin, Balthazar de Beaujoyeux. From that time, which may be considered the age of its revival in Europe, dancing made a gradual progress towards its present state of refinement.

Among the recreations of the English court, during the reign of Henry the Eighth, dancing is frequently mentioned. The king himself was, doubtless, an admirer of this art. Lloyd says, that "Sir W. Molyneux got in with King Henry the Eighth by a discourse out of Aquinas in the morning, and a dance at night." In the age of Elizabeth, dancing seems to have been held in considerable esteem: the queen took great pleasure in it; and many of her favorites were indebted as much to their elegant accomplishments, as to their valour or wisdom, for the sunshine of her favour. In that reign, to use the words of Gray,

> Full oft within the spacious walls,
> When he had fifty winters o'er him,
> My grave Lord Keeper led the brawls;
> The seals and maces danc'd before him.

From the death of Elizabeth until after the restoration of Charles the Second, the turbulence of the times, and the peculiar character of the age, prevented this art, which flourishes only in the "bowers of peace and joy," from making much progress; but in the days of the merry monarch it began to revive and advanced, more or less in all the succeeding reigns. The celebrated Beau Nash, who was for a long time Master of the Ceremonies at Bath, may be considered the founder of modern ball-room dancing, which, however, has since been divested of much of its cold formality, and improved in various other respects. It is, nevertheless, a matter of regret that the graceful and stately Minuet has been entirely abandoned in favour of the more recently invented dances.

The French Country Dances, or Contre-danses (from the parties being placed opposite to each other), since varied into Quadrilles (so called from their having four sides), which approximate nearly to the Cotillon, were first introduced at Paris about the middle of the reign of Louis the Fifteenth. Previously the dances most in vogue were La Perigourdine, La Matelotte, La Pavane, Les Forlanes, Minuets, &c. Quadrilles were at first danced by four persons only; four more were soon added, and thus the complete square was formed; but the figures were somewhat different from those of the present period. The gentlemen advanced with the opposite ladies, menaced each other with the fore-finger, and retired clapping their hands three times; they then turned hands of four, turned their own partners, and concluded with a grand rond. Monsieur Vestris introduced the Gavotte, which he taught to Monsieur Trenis and Madame de Choiseul, who first danced it at a fête given at the Hotel de Valentinois, on the 16th of August, 1797: at this fête Monsieur Hullin introduced an entirely new set of figures of his own composition. These elicited general approbation; they were danced at all parties, and still retain pre-eminence. The names of Pantalon, L'Eté, La Poule, La Trenis, &c., which were given to the tunes, have been applied to the figures. The figure of La Trenis was introduced by Monsieur Trenis's desire, it being part of the figure from a Gavotte, danced in the then favorite ballet of Nina.

To the French we are indebted for rather an ingenious, but, in the opinion of many professional dancers, a useless invention, by which it was proposed that, as the steps in dancing are not very numerous, although they may be infinitely combined, characters might be made use of to express the various steps and figures of a dance, in the same manner as words and sentences are expressed by letters; or, what is more closely analogous, as the musical characters are employed to represent to the eye the sounds of an air. The well-known Monsieur Beauchamp, and a French dancing-

master, each laid claim to be the original inventor of this art; and the consequence was a law-suit, in which, however, judgment was pronounced in favour of the former. The art was many years ago introduced to this country, but without success. An English dancing-master also, with considerable labour and ingenuity, devised a plan somewhat similar to that of the French author, diagrams being proposed to represent the figures, or steps, instead of characters; but it met with no success.

There are a variety of dances to which the term National may, with some propriety, be applied. Among the most celebrated of these are—the Italian Tarantula, the German Waltz, the Spanish Bolero, and the Scotch Reel. To dwell on their peculiarities would, however, as it appears to us, be useless; the first is rarely exhibited, even on the stage; the second, although it still retains much of its original character, has, in this country, been considerably modified; the graceful Bolero is restricted to the theatre only; and the Scotch Reel is now seldom danced excepting at Scottish parties.

THE BOLERO.

PRACTICAL OBSERVATIONS AND EXERCISES.

However impossible it may be to acquire a knowledge of dancing unassisted by a master, we feel satisfied that, without depreciating the talent or attention of those by whom they have been instructed in the art, many of our readers may derive much benefit from an attentive perusal of the following observations. It would be folly for us to attempt teaching steps, and useless to offer a series of figures; our attention will be much more profitably directed, so far as regards the reader, to the carriage and deportment of the person, and in suggesting such simple exercises as will tend to improve those who are deficient, and to confirm those who are correct.

OF THE ARMS AND HANDS.

The proper carriage of the arms is certainly one of the greatest difficulties in dancing; it therefore demands the utmost attention on the part of the pupil. Of all the movements made in dancing, the opposition, or contrast, of the arms with the feet is the most natural to us: to this, however, but little attention is in general paid. If any person be observed, when in the act of walking, it will be found that when the right foot is put forward, the left arm follows, and *vice versâ:* this is at once natural and graceful; and a similar rule should, in all cases, be followed in dancing. As much depends on placing the arms properly, and in moving them with grace, as in the execution of steps—for dancing consists not in the motion of the feet alone—it requires the appropriate accompaniment of the arms and body, without which the art degenerates into a mere fantastic mode of stepping. The arms should be kept in an easy, semi-oval position, so that the bend of the elbows be scarcely perceptible; otherwise they would present right angles, which would so offend the eye as to destroy all appearance of ease or elegance. Care must be taken neither to raise the shoulders nor to spread the arms too far out. The proper situation of the arms, in dancing, is a little in front of the body; they should advance or recede in a natural series of oppositions to the direction of the feet in the execution of the various steps; their movements, in performing these contrasts, must not be sudden or exaggerated, but so easy as to be almost imperceptible.

The dress should be held between the fore-finger and thumb of each hand; it is a matter of importance to overcome both tremor and rigidity of the fingers, which should be gracefully grouped, so

that the palm be partially seen in front. In dancing Quadrilles, when the lady advances with her partner, and in all the figures where the hands join, the arms should be kept of such a moderate height as is consistent with grace (fig. 1). It is also necessary that the arms should be properly supported, and not suffered to weigh or drag upon those of the persons with whom it may be proper to join hands in the course of the dance. To say nothing of the positive impropriety of falling into such an error, the mere act, during its continuation, is quite destructive to grace, which cannot exist where ease is not apparent. Elegance without affectation, may be shown in presenting the hand to a partner: rustic abruptness, and childish timidity, are equally to be avoided; a modest confidence is the golden mean to be observed in this, as in every other department of ball-room dancing. To grasp the hand of a person with whom it is necessary to join hands, to detain it when it should be relinquished, are faults which, we trust, our reader's good sense would prevent her from committing, even when dancing with one of her own sex; but even these offences, in the consideration of propriety and taste, are not more grave than that of display. However excellently a young lady may dance, and whatever powers of brilliant execution she may possess, she should never forget that she is in a ball-room, and not on a stage: studied attitude in presenting the hand (fig. 2) is reprehensible, as being productive of too much effect, and as showing an inclination for display. Correct execution of the figure and steps, and unobtrusive grace of deportment, should be the zenith of a young lady's ambition; as Shakespeare finely expresses the perfection of dancing, she should move like a wave of the sea; it being, of course, understood, when the elements are in their most gentle motion. When the hand is not to be presented to another,

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the arm should depend from the shoulder in an easy oval shape, as previously directed.

OF THE FEET, ETC.

The principal study, with regard to the feet, in dancing, consists in acquiring a power of turning them properly outward; in bending the instep, without effort, immediately the foot quits the ground; and in alternately practising with each foot, so that both may attain an equal degree of execution; it being decidedly inelegant and awkward for one foot to be constantly active and correct in its movements, while the other remains comparatively unemployed.

To dance with the instep concave, instead of convex, and the toes turned upwards, instead of the contrary, is termed dancing flat-footed, and is ungraceful to the last degree. The toes should be well pointed downward, and the knees outward, to correspond with them; but it is impossible to produce a union of grace in these particulars, unless the action of the instep and the knee be supported and accompanied by that of the hip. In the ball-room, all the steps should be performed in an easy, graceful manner: no noise of stamping should, on any account, be made; the steps should be performed with minute neatness, and in as small a compass as possible; the feet should never be violently tossed about, or lifted high from the ground: the young lady should rather seem to glide, with easy elegance, than strive to astonish by agility, or by violent action, make it appear, that, to her, dancing is a boisterous and difficult exercise. (Fig. 3, illustration of the Waltz.) But while we thus caution our reader against adopting those styles—one of which may be deemed operatic, and better adapted to a ballet than a Quadrille, and the other, rustic, and more applicable to the village-green than the ball-room—it is necessary for us to warn her against falling into the opposite error of listlessness and inaccuracy; with these, elegance can never be obtained: the former makes her appear to be condescending to join in an amusement she despises, and the latter induces a supposition in the minds of those who may not be

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supposed to know aught to the contrary, that she is either unusually dull, or has never had an opportunity of obtaining the benefit of instruction from a proper master.

OF THE BUST.

It has been very judiciously remarked, by a contemporary writer on this subject, that the pupils of a great *artiste* will display his merit in the graceful movement of the figure, as much as in the neat execution of the steps.

The body should never be suffered to sink into idle attitudes; as rounding the back, forcing the shoulders up to the ears, projecting the back part of the waist, or stooping forward; such careless habits, if long permitted, eventually produce local deformities. Affectation of primness is as much to be avoided as indolence: the admirable union of ease and grace, which constitutes elegance of deportment, can never be obtained by those who indulge in either of these faults. The body should always be kept in an easy and unaffected erect position, except in the execution of certain steps which require the bust to be thrown a little forward; but, even in these cases, care must be taken that the body do not lose its perfect balance. The chest should be advanced, the waist retiring, and the shoulders depressed: by these means, the bust will be naturally and elegantly developed; and the shoulders, by being brought to range evenly with the back, appear of their proper breadth, and form a graceful contrast to the waist.

OF THE HEAD.

The head should be kept centrally between the shoulders by the erectness of the neck: the face may, of course, be occasionally turned to the right or left, not merely for convenience, or to avoid an appearance of constraint, but because the opposition which may be produced by a judicious change of the direction in which the countenance is turned, to the posture of the body or limbs, materially enhances the grace of the whole figure. The turn of the head should be so managed as to perfect the real and apparent balance of the figure. If the greatest weight be thrown on one side, the head may, generally speaking, be very advantageously turned, in a trifling degree, in the opposite direction. The head should be thrown considerably backward, and the forehead brought to project in a slight degree, by drawing the chin towards the neck. The countenance, during a dance, should be illumined by a smile, or at least not be severe; it is perfectly absurd for a young lady to exhibit a melancholy aspect amid the gaieties of a ball-room,

and painful to see her assume an aspect of care, when going through a Quadrille; as it induces the spectators to imagine, that the performance of the steps or figure, so entirely engrosses her faculties, that she is incapable of partaking in the pleasures of the dance.

POSITIONS, BATTEMENS, AND OTHER EXERCISES.

The positions constitute the alphabet of dancing. They form the basis of every step; and if each of them be thoroughly understood, and an accurate mode of performing it acquired, the subsequent progress of the pupil will be materially facilitated.

The *Battemens, &c.* in the positions, form a series of very graceful domestic morning exercises, and we strongly recommend their frequent practice, even by those who have acquired some proficiency in the art, as they tend to correct many errors which are acquired by carelessness, during or after tuition, as well as to impart brilliancy and correctness of execution—to facilitate the bending of the ankle—to improve the balance, the carriage of the arms, and the development of the bust—and to produce that general harmony of motion in which the chief beauty of dancing and general elegance of deportment consist.

The *first position* (fig. 4) is formed by placing the two heels together and throwing the toes back, so that the feet form a parallel line. The body should be kept perfectly erect; the shoulders should be thrown back, and the waist advanced; the arms rounded, and the fore-finger and thumb occupied in holding out the dress, the other fingers being gracefully grouped. During the first at-

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tempts, the toes should not be more turned back than will admit of the body maintaining its proper balance; they must be brought

to assume the correct position by degrees, until the pupil can place the feet, heel to heel, in a parallel line with each other, without affecting the steadiness of the body or arms.

The *second position* (fig. 5) is formed by moving the right foot from the first position, sideways, to about the distance of its own length from the heel of the left. When the foot is thus placed, the heel must be raised so that the toes alone rest on the ground, the instep being bent as much as possible, and the foot turned so as to retain its primitive direction outward; as in the case of the first position, the foot should be brought to perform the action of the second, in a perfectly correct manner, by degrees, and the toes should be gradually thrown back as far as the pupil's power to preserve her balance will permit.

The *third position* (fig. 6) is formed by drawing the right foot from the second position, to about the middle of the front of the left; the feet are to be kept close to each other. In drawing the right foot into this position, the heel must be put to the ground as it approaches the left, and kept forward during its progress, so that the toe may retain its proper direction outward.

The *fourth position* (fig. 7) is formed by moving the foot about its own length forward from the third position, directing the heel outward, and turning back the toe during the progress of the foot; it may also be slightly raised, and should be so placed as to be exactly opposite to the centre of the left foot, which, in this as well as in all the preceding positions, and also in the next, is to retain its primitive situation.

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The *fifth position* (fig. 8) is formed by drawing the right foot back from the fourth position, so that the heel is brought close to the toes of the left foot, the feet being completely crossed. The

right heel, in this position, is gradually brought to the ground as it approaches the left foot, as in drawing the left foot from the second to the third.

Bending the knees outward and rather backward, without raising the heels, and still keeping the body perfectly erect, is an exercise which should be performed in all the positions: it will impart flexibility to the instep, and tend to improve the balance. The pupil in her early essays in this exercise, should support herself alternately with each hand against some fixed object. She must by no means attempt to raise herself by swinging one arm in the air; it should rather be occupied in holding out the dress, in the manner previously directed. The knees should be only slightly bent at first, and the difficulties of the exercise may be overcome by degrees, until she can perform it perfectly well without any support, or discomposing the proper position of her body and arms.

Battemens en avant (fig. 9) are performed by raising the right leg from the third position into the fourth in front, as high as the knee, with a quick jerk, keeping the knee straight and the toes well pointed—the heel maintaining the same position as if on the ground—and letting the leg fall back into the fifth position in front. The left leg during this exercise remains steady, the knee straight, with the whole weight of the body upon it, so that the right leg may act with perfect ease and freedom.

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Battemens en arrière (fig. 10) are performed by throwing the right foot up behind in the fourth position, with the same rules as for the Battemens en avant; great attention must be paid to prevent the body inclining forward in this portion of the exercises;

it should be kept perfectly straight, but without any appearance of stiffness. The *Battemens en avant* and *en arrière* are performed, among professional dancers, by raising the foot much higher; but it is unnecessary to do so as a domestic exercise for ball-room dancing.

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Battemens on the second position (fig. 11) may be made in the following manner. The pupil must support herself in the same manner as in the practice of bending, before described; she should then pass the foot into the second position—the knee being kept perfectly straight—draw it back into the fifth position before; pass it again into the second position, and draw it into the fifth behind; and so on, until by repetition of the exercise, she can perform these Battemens with rapidity, ease, and correctness.

When the bends in the various positions have been practised some time, the pupil should endeavour, after each bend, to raise herself on the toes (see fig. 12), being careful that the knees are kept straight, and that the feet do not change their positions. This is an excellent practice, as it imparts to the feet the point so much admired, and at the same time considerably increases the power of the instep and ankle.

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Petits Battemens sur le coude-pied (fig. 13) are very difficult of execution; they are practised by accomplished dancers, for the purpose of giving ease in elevation, and what is termed *aplomb*; they also impart, in certain steps, that vivacity which no other

practice will give; we here, of course, allude to professional, and not private dancing. The reader may, however, attempt them, and if she can succeed in executing them, they certainly form a graceful and beneficial exercise. They are first performed with one foot entirely on the ground; but after some practice, the pupil lifts the heel from the ground, so as to rest entirely on the toes, and executes the *Battemens* in that position with great rapidity. If the knee and hip be free from stiffness, the difficulty of the exercise is partially overcome; and it is, in the first instance, to produce an ease and pliability in those parts, that they are principally practised. These *Battemens* consist of a rapid movement of the right foot, from the instep to the hinder part of the leg, by a mere movement of the knee.

Having gone through the positions and *Battemens* with the right foot, it is absolutely necessary to do them with the left, observing at the same same, that when the positions are practised with the right foot, the left must, of course, in its turn remain stationary, and the whole of the weight be thrown upon it. The *Battemens* should be practised until the pupil can make them with some degree of what a professional dancer would call brilliance, with either foot, unassisted by the support which is necessary when they are commenced.

Before concluding our article, we deem it expedient to describe the approved mode of performing the Curtsey; and as our aim is to improve the general deportment in society, as well as in dancing for the ball-room, to offer a few observations on walking.

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The performance of the curtsey in a proper manner, proves a matter of difficulty to some young ladies; but it will be found very easy, after a little practice, to curtsey with grace, if proper directions be attended to. The following is the usual mode: The

front foot is first brought into the second position; the other is then drawn into the third behind, and passed immediately into the fourth behind—the whole weight of the body being thrown on the front foot; the front knee is then bent, the body gently sinks, the whole weight is transferred to the foot behind while rising, and the front foot is gradually brought into the fourth position. The arms should be gracefully bent, and the hands occupied in lightly holding out the dress. The first step in walking, after the curtsey, is made with the foot which happens to be forward at its completion. The perfect curtsey is rarely performed in society, as the general salutation is between a curtsey and a bow (fig. 14).

The manner of walking well is an object which all young ladies should be anxious to acquire; but unfortunately it is a point too much neglected. In the drawing-room, the ball-room, or during the promenade, an elegant deportment—a "poetry of motion"—is, and ever will be, appreciated. The step ought not to exceed the length of the foot; the leg should be put forward, without stiffness, in about the fourth position, but without any effort to turn the foot out, as it will tend to throw the body awry, and give the person an appearance of being a professional dancer, as exemplified in fig. 15, which is tolerably correct in other respects, except in the position of the feet. The head should be kept up and the chest open; the body will then attain an advantageous position, and that steadiness so much required in good walking. The arms should fall in their natural position, and all their movements and oppositions to the feet be easy and unconstrained. The employment of soldiers to teach young ladies how to walk, which, we are sorry to say, is a practice adopted by many parents and heads of seminaries, is much to be deprecated. The stiffness acquired under regimental tuition is adverse to all the principles of grace, and annihilates that buoyant lightness which is so conducive to ease and elegance in the young.

QUADRILLES.

It should be observed that the couple standing on the right hand of the leaders count as the third couple, and take precedence of the fourth.

First Set.—This can be danced with four, eight, twelve, or indeed any number of even couples, care only being necessary to understand which couple is your *vis-à-vis*.

1. *Le Pantalon.* — Top and bottom couple *Chaine Anglaise. Balancez* and turn partners. *Chaine des dames,* half promenade, and half right and left to places.

2. *L'Eté.*—First lady and opposite gentleman advance and retire, *chassez* to right and left. Cross over to each other's places, and

again *chassez* to right and left. Re-cross, *balancez,* and turn partners to places.

3. *La Poule.*—First lady and opposite gentleman cross, presenting the right hand, return with left, giving right to partners, and fall in a line. Set four in a line, holding hands, and half promenade to opposite sides. First lady and opposite gentleman advance and retire twice, and turn. Both couple advance, and retire, half right and left to places.

4. *Trenise.*—First couple advance and retire twice, the lady remaining on the left of the opposite gentleman. The two ladies then cross over, passing round the first gentleman, who advances up the centre, all dancing back to places. Both couples set and turn partners.

5. *Pastorelle* (when this is danced *Trenise* is generally omitted).—First couple advance twice, leaving the lady on the left of the opposite gentleman. The two ladies and the opposite gentleman then advance and retire twice, and remain while the first gentleman dances a *pas seul.* The four join hands, make a *demi ronde* to the left, separate, and return to places by a half chain.

Another way.—First couple advance and retire, advance again, leaving the lady in the hand of opposite gentleman, who advances and retires with both ladies; then advances again, and leaves the two ladies with opposite gentleman, who in the same manner advances and retires with them, and then advances again, and all four join hands in a *demie ronde* to opposite places; then return to their own by a *demie chaine Anglaise.*

Finale.—Grande ronde and *l'Eté,* terminating with a galopade quite round.

Another way.—Grande ronde; opposite couples advance *en galop oblique,* and return; advance again and return. Ladies chain, half promenade to opposite places, return half right and left.

Lancers.—1. *La Rose.*—The first lady and opposite gentleman advance and retire, readvance, and turn with both hands to places. The first couple then join hands and cross over between the opposite couple, who pass outside them: the first couple then return to their places, passing outside the opposite couple, who return with joined hands to places; all set at corners and turn.

2. *La Ladoiska.*—The first couple advance twice, and the lady is left in the centre; chassez to right and left, and turn to places all advance in two lines and turn partners to places.

3. *La Dorset.*—The first lady advance and stop, opposite gentleman advance and stop, lady curtsies and retires, gentleman bows and retires, double chaine des dames.

4. *L'Etoile.*—First couple set to the couple on the right hand,

bow, then set to the couple on the left, chassez croisez with them, and back to places; right and left with opposite couple.

5. *Les Lanciers.*—La grande chaine, ladies beginning with their left hand, gentlemen with their right; then the first couple promenade round the inside, and face the top, the side couples (first the right, then the left) fall in behind, and with the bottom couple form four lines; chassez croisez with partners, and back again; the ladies turn outside the line to the right, the gentlemen to the left, the couples meeting at the bottom, advance up the centre with joined hands. The four ladies then form a line holding each other's hands, the gentlemen the same opposite; all advance and retire, turn partners to places, and finish with grande chaine.

Caledonians.—*For eight only.* (*Each figure takes eight bars.*)

1. First and opposite couple hands across, and back again. Set and turn partners. Chaine des dames. Half promenade and demi chaine.

2. First gentleman advances, returns, advances and returns again. The four gentlemen set to ladies on their left, turn with both hands, each lady taking the next lady's place. Grande promenade. The same for the other three couple, so that at the fourth time each lady finds herself in her own place.

3. First lady and opposite gentleman advance and retire, advance again and turn to their places. First and opposite couple cross over, first couple passing between the opposite couple in going over, and outside of them in returning. The eight set and turn to their places. All set in a circle to the left once round.

4. The first lady and opposite gentleman advance and stop; third lady and opposite gentlemen the same, set and turn partners to places. The four ladies move to the right, taking next lady's place, and stop. The gentleman do the same to the left. The same is repeated by both, which brings all back to their places.

5. The first couple chassez round the inside of the set. The four ladies advance into the centre, join their right hands on high and retire. The four gentlemen do the same. The eight set and turn partners. Grand chain half round, half promenade to places, and turn partners. The four gentlemen change places with the four ladies, all turn corners and return to their places. Finish the fourth time with either grande ronde or chassez croisez.

The Polka.—The position of the lady and gentleman is almost the same in the polka as in the ordinary waltz. The lady should have her right hand placed in the left of her partner, and the other upon his shoulder, keeping her head in its natural position, without either raising, sinking, or turning, and allowing herself to be entirely guided by him.

The polka is danced in two-four time to a march movement, and rather slow. The step is divided into three measures.

For the first, the right foot should be slightly raised to the side of the left leg without passing it behind, and so as to barely touch the calf. In this position you spring lightly upon the left foot, in order to give the spring to the right, which makes a glissade forward, in the fourth position.

The second and third times are composed of two short steps made lightly by either foot, care being taken that both feet find themselves nearly in the same line.

At the second short step, the left leg is raised, the heel being near the lower part of the right calf, and the fourth bar is suffered to pass, which occasions three bars only to be marked. You then recommence with the other foot, and so on with the rest.

The lady should always begin with the right foot, and the gentleman with the left, as in the ordinary waltz.

The polka presents in execution many peculiar evolutions, which contribute much to vary it. The lady must allow herself to be entirely guided by her partner, sometimes turning to the right, sometimes to the left, retreating from or advancing upon him, in a straight line, by help of that well-known movement, which in the language of the waltz is called a *redowa*. These variations, as already said, are entirely left to the gentleman, who introduces them according to his fancy or the exigencies of the locale.

The imagined facility of the polka has perhaps, by vulgarising it, produced, if not its complete fall, yet its comparative banishment. In this dance, as in so many others, there are shades of peculiar delicacy, and even difficulties, which are only to be surmounted by practice. Whoever pretends to execute the polka in a ball-room without being sufficiently prepared, will almost to a certainty appear awkward. The polka of good society will ever require teaching and study.

The Valse a Trois Temps.—This which is called the old waltz, although still danced at the court balls of Paris, Belgium, and Germany, is now nearly superseded in this country by the *valse à deux temps*. But as it continues to maintain a place in some English ball-rooms, it is desirable to understand at least its principles.

When the gentleman has placed himself opposite to his partner, with his right arm round her waist, he sets out with his left foot and she with her right foot.

The step of the gentleman is made by placing his left foot before his partner. That is for the first movement.

He brings the right foot, slightly crossed, behind the left, the heel raised, and the toes pointed to the ground. That is for the second.

He next pivots upon both feet, rising upon his toes, to recover himself, the right foot foremost, in the third position—stretches out the right foot aside, glides the left foot also aside while turning on the right—then brings the right foot forward to the third position. This is for the third, fourth, fifth, and sixth.

The lady sets out at the same moment as her partner on the fourth step, executes the fifth and sixth, and continues on the first, second, third, and so on.

The preliminary step is made by the gentleman; he places the right foot a little in advance at the first position, lets the second pass, and springs upon the right foot, raising the left leg to meet the third note of the music, and unites the first step of the waltz. This preparation gives the lady the signal for setting out.

With the first six steps we should execute a complete *round*. Formerly it was the custom to count by three equal steps, but this vicious habit has been properly reformed, considering that the three first steps are not made like the three last. The best way is to count by six steps linked to each other.

A demi round is performed with the three first steps, and the other demi round with the three last.

The three first steps should be equally executed in the first demi round; but it is not the same with the three last; at the fourth step the gentleman, without turning, places his feet between those of the lady, completing his demi round in passing before her with his sixth step, and bringing up the right foot at the sixth.

The Valse a Deux Temps.—This is, perhaps, justly called the waltz of the day, and does not seem destined soon to lose the unanimous favour in which it is held both in France and other countries.

The music of this waltz is in the same time as that of the *valse à trois temps*, except that the orchestra should rather quicken the movement and mark it with great distinctness.

The step is very simple, being nothing more than the gallop executed by either leg while turning; but instead of springing, it is essential to glissade thoroughly, avoiding everything like starts or jerks. The position of the foot has already been explained in the directions for the *valse à trois temps*. The dancer should keep her knees free from stiffness; if they are too tense, they force her to spring, which, as we have already said, is to be avoided, and she should abstain from leaning heavily upon the hand or shoulder, which in waltz-language is termed *clinging*.

It is requisite to make a step to every beat—that is, to glissade with one foot, and to chasser with the other. Differing in this from the *valse à trois temps*, which describes a circle, the *valse à deux temps* is danced squarely, and turns only upon the glissade. It is essential to note this difference of movement, in order to appreciate the character of the two dances.

In this waltz two steps are executed to three beats of the music; the first is a sliding step to the first beat—the second a chassez, which includes two steps in one, and brings what is really the second step on the third beat. By observing this the dancer is always sure of keeping time.

The lady in the *valse à deux temps* sets out with the right foot, and the gentleman with the left. The steps should be made rather small.

The Redowa.—The redowa is much more talked of than practised. This dance, originally Bohemian, is executed by couples, like all the other waltzes, and is composed of three parts distinct from each other.

1st. The *pursuit.*

2d. The waltz, called *redowa.*

3d. The *valse à deux temps,* executed to a peculiar measure, and which, by a change of the rhythm, assumes a new character.

The great obstacle to the redowa is, the necessity of more space for it than ball-rooms generally afford.

The middle of the floor must be reserved for the dancers who execute that peculiar promenade, called *the pursuit,* while those who dance the waltz turn in a circle about the room. It may be imagined that these two different manœuvres require a certain space, and besides this, a certain order in the dances, which is rarely met with.

The time of the redowa is *à trois temps,* and should be played much more slowly than the ordinary waltz.

The position of both lady and gentleman is the same as for the *valse à trois temps.* The lady sets out with the right foot, and the gentleman with the left.

In the *pursuit* the position is different; the lady and her partner face, and take each other by the hand; they advance or fall back at pleasure, and *swing* (balance) in advance and backwards.

To advance, the step of the *pursuit* is made by a glissade forward without springing, *coupé* with the hind foot and *jeté* on it, you recommence with the other foot, and so on for the rest.

The retiring step is made by a sliding step of the foot backwards without springing, and *jeté* with the front foot, and *coupé* with the one behind.

It is necessary to advance well on the sliding step and to spring lightly in the two others *sur place*, balancing equally in the *pas de poursuite*, which is executed alternately by the left foot in advance, and the right backwards.

The lady should follow all the movements of her partner, falling back when he advances, and advancing when he falls back. The step of the redowa in turning may be thus analysed for the gentleman.

Jeté of the left foot, passing before the lady as in the *valse à trois temps*—glissade of the right foot behind to the fourth position aside—the left foot is brought to the third position behind—then the *pas de basque* is executed by the right foot bringing it forward, and you recommence with the left.

The *pas de basque* should be made in three very equal beats, as in the mazourka. The lady performs the same steps as the gentleman, beginning with the right foot.

To waltz *à deux temps* to the measure of the redowa, we should make each step upon each beat of the bar, and find ourselves at every two bars, the gentleman with his left foot, and the lady with her right—that is to say, we should make one whole and one half step to every bar.

Spanish Dance.—The couples are placed as for a country dance, but before commencing the lady and gentleman at the top change places. They then set to the next couple, and change places with them; set to partners, with a waltz step cross again to the other places, set again to second couple, and then back to places and set to partners. All four then join hands, advance, retire, the two gentlemen turning the ladies to the right, and changing places with each other, till the four corners are turned. The two couples then waltz round each other either four or eight bars, according to the music, and repeat the figure with the next couple, and so on to the end of the line. When the first couple begin to dance with the fifth couple, the second couple begin with the third, so as to leave two couples between. When there is a long line, the figure is usually commenced at every sixth couple. The figure is ended when the top couple have been to the bottom of the dance and returned to their original places.

The Schottische.—This dance composes a polka movement and a circular hop. It is danced in couples, and its position is identical with the waltz. It commences with three *pas marché* sideways, finishing with one foot up behind, then jump on the foot that is down. The same with the other foot. Then four times *jeté* forward; jump on the foot which is down. In some instances the *valse à deux temps* is introduced in lieu of the four *jetés*.

The Galopade.—The step is danced in couples, as in waltzing.

The galopade is simply a chassez with one foot, as long as you continue the same way, and chassez with the other foot when you turn. The step of the galopade, in turning, is the same as the step of the *valse à deux temps*.

The Varsovienne.—This exceedingly graceful dance is performed in mazourka time. The first step consists of a polka step with a glissade, followed by a pause, the foot being afterwards drawn in. The second step consists of the polka-mazourka step, concluding with the first step.

Sir Roger de Coverley is danced like all country dances; the gentlemen in a line, on the right from the top, and the ladies in another, opposite their partners. The first gentleman at the top and the lady at the bottom of the line commence each figure; the other gentleman and lady at the opposite corner have to repeat the figure immediately, so that two couples are always concerned in the figure. 1st. First lady and gentleman meet in the centre, give *right* hands, turn once round, and retire to their corners; the same for the other two at the top and bottom. 2d. First couple cross again and give *left* hands, and turn once back to places: repeat this. 3d. First couple give *both hands;* the others the same. 4th. First couple dos-a-dos, and retire to places; the others the same. 5th. The first couple advance, *bow to each other*, and retire; the same repeated by the other couple. 6th. The top gentleman casts off to the left and passes to the bottom, outside the line, and the top lady, his partner, casting off to the right, does the same; all the other ladies and gentlemen follow the leaders, who take their places at the bottom of the dance, giving right hands and raising their arms, under which all the other couples must pass. The first lady and gentleman remain at the bottom until by a repetition of the figures they gradually regain their places at the top, when the dance may cease or be continued.

La Tempete.—Four couples arrange themselves in two lines opposite each other, then advance, retire, and cross over; and afterwards repeat to their places. The two opposite couple in the centre, cross hands, those outside turn. Hands four round, and then back to places. Then right advance and retire: top line pass through next line, and, finally, repeat the whole to the bottom of the room. As many sets as can find room may stand up in this manner, each four couples face to face, and the whole may commence at the same time, the top couples passing to the bottom, and the bottom to the top. This is the original method, as danced in Paris, and, as it possesses much simplicity and grace, many prefer it.

Another method.—Form lines of two couples opposite each other, as in a quadrille, but without sides and closer; form lines of four behind the second line, as many as intend to dance. *Figure.* The first two lines advance and retire twice, right and left, chassez croisez with your partner, déchassez behind the second couple. The centre four hands round, the outside couples turn and back to place. The four inside give right hands across, whilst the two couples outside give right hands also; turn once round, after which all eight change, and giving left hands, swing round to the right, to places. Advance and retire, holding hands. The four at the top lead through the second line, and begin the same figure with the third line, and so on to the bottom of the dance.

INDIAN SCEPTRE EXERCISES.

We are told by Miss Leonora Geary, the well-known teacher of these now popular exercises, that they are "important to all young ladies who, from close application to sedentary accomplishments, require something that will effectually throw off that undignified and often awkward bearing, which is a well-known drawback to many an accomplished girl. *La bonne tenue* is not acquired by dancing alone: experience has shown that the carriage of the figure is the first point; the movement of the body, the second; the training of the feet, the third; and it is by a steady perseverance in cultivating these three points that elegance of movement is produced."

Miss Geary further observes, that the class of exercises termed calisthenic, are either so violent, and demand so great an exertion of muscular strength, that they are totally unfitted for young ladies, or are so frivolous and unmeaning that no advantage, healthful or ornamental, can result from them. In many instances a skipping-rope would be far preferable. The Indian Sceptre exercises combine grace with activity, and are strictly adapted to ladies. By a gradual exertion of the muscles they increase the physical strength to a degree almost incredible, and that without any shock or vibration of the frame. Two of the most striking beauties resulting from the judicious practice of the sceptre exercises consist in a healthful expansion of the chest, and a peculiarly graceful movement of the arms and body.

The sceptres are from eighteen inches to two feet long, tapering from about three inches diameter at the club end, to an inch at the handle, made of light wood, generally painted green and varnished.

First Lesson.—Hold the sceptres upright in front of the body, with the arms extended horizontally. Carry the sceptre in the right hand with a swinging motion over the head and left shoulder.

A circle must commence from the moment the sceptre moves from the front, descending obliquely behind, and gradually ascending to the front again, where it resumes its first position. The same is then done with the left hand, and continued with the right and left hand alternately.

Second Lesson.—Throw the sceptres upright, holding them above the head; then lower them to the front of the body, and project them at full length equilaterally; draw them back and project them at arms' length from the sides; then, holding the sceptres loosely between the thumb and first two fingers, suspend them behind the shoulders, bringing them gradually down to the sides. Swing the sceptre of the right hand over the head and left shoulder, and carry the sceptre out in a direct horizontal line to the right. The same is then done with the left hand, and so on alternately, each arm being extended in turn, with the sceptres held horizontally.

Third Lesson.—(Miss Geary calls this *single-shooting.*) Let the right-hand sceptre be thrown up straight in front of the head, and gently swung round it; then project it from the side at full length, bringing it round to the front while gradually changing its position to an acute angle. Repeat the same alternately with each hand.

Fourth Lesson.—(This is called *double-shooting.*) The first two movements are the same as in the third lesson; then project both arms at once, the left horizontally to the side, the right perpendicularly above the head, and repeat the same alternately.

The *fifth lesson* is called the *wheel-movement*, and consists chiefly in the alternate swinging of the sceptres round the head and shoulders..

These five lessons will afford a pretty fair notion of the Indian Sceptre Exercises; but there are seven more, and for these we must refer our fair readers to Miss Geary herself, whose establishment is in Grafton Street, Bond Street.

THE ARTIST.

THE ORNAMENTAL ARTIST.

Here, from the mould, to conscious being start
Those finer forms—the miracles of art;
Here chosen gems, imprest on sulphur, shine,
That slept for ages in a second mine.

RTICLES of utility as well as ornament, in a number of elegant forms, constructed of several kinds of light materials, and variously embellished by the hands of young ladies, so frequently, now-a-days, decorate the cabinet, the work-table and the boudoir, affording at once such means of graceful occupation, and opportunities for the display of good taste and dexterity in many interesting arts, that our work might be considered incomplete, if we did not devote a portion of its pages to some subjects of this nature. It is our intention, therefore, under the general head of the Ornamental Artist to describe the process of modelling in wax, clay, paper, pasteboard, glass, sulphur, &c. the modes of painting on velvet, glass, &c. and of making screens, baskets, and other ornaments, of feathers, beads, straw, alum, lavender, gold thread, &c. In one of Miss Edgeworth's works there is a pleasing account given of a pasteboard tray, constructed by some young persons, and divided into compartments for the reception of shells arranged according to their species and genera. A

writer in the 'Magazine of Natural History,' in noticing this passage, takes occasion to observe, that with a view to lead young persons to habits of order and arrangement, similar trays ought to be given to them; or, what would be still better, they might be taught the mode of working in pasteboard, so as to be able to produce such articles of convenience themselves. In this we most cordially agree, for, next to the pleasure of collecting in the fields, is that of seeing specimens preserved neatly and in good order; and nothing is better fitted for this than pasteboard boxes. To the mode of working in this material, we shall devote as much space as the comparative importance of the other subjects we intend to treat on, in the following pages, will permit: among them, the art of modelling in wax and clay claims precedence.

MODELLING IN CLAY AND WAX.

The art of sculpture, of which modelling is a principal branch, is nearly coeval with the existence of mankind in a state of society. To raise a rude stone in memory of a remarkable person or event, was customary in the primitive nations; and our knowledge of their history, and of the institutions that existed previously to the use of letters, is principally derived from hieroglyphical sculptures.

It is commonly understood, that sculptors actually use the chisel, and execute with their own hands the works that bear their names; this is not the case. "From the chisel of Chantrey," is a metaphorical expression: but that distinguished artist was better employed than in chiselling marble. The province of the master mind is to execute, in clay or wax, a model of the intended work. The imitation of a model, in marble or other stone, is done by the most certain process of geometrical measurement, mechanically applied to transfer a sufficient number of points from the model to the stone, to preserve the form of the original work; so that it is necessary only to have a careful workman, with the proper machine, to bring out the model to perfection in marble or other stone. The bronze is completed by the simple process of making a mould from the model, in a material capable of standing the heat of the metal in fusion: the mould is then broken off, and the bronze is sometimes worked upon by the sculptor, and an artificial bronze put upon it, to make it of one colour; pure antiquarian taste would, however, prefer the brown which arises from the natural discoloration of the metal, by the effect of the common air upon it.

Wax is the best material for small works, such as miniature portraits, models, &c., Large subjects are more commonly modelled in pipe-clay, well-tempered by wetting and beating it with a mallet. The whole process of preparing the clay, and the ope-

ration of casting in plaster, which succeeds the modelling, are too dirty and laborious for ladies. In large towns, wax may be bought ready for moulding; and it is advisable to purchase rather than to prepare it. As, however, some of our readers may be so situated as to be unable to buy it in a proper state, we deem it advisable to offer a few instructions for its preparation. The wax should be the fine white material which is used in making candles. To two ounces of flake white, add three ounces of Venice turpentine, if it be in the summer, and four in winter; and sufficient vermilion to give it a pinkish tint: grind these together on a stone with a muller; and then put them into a pound of wax, molten in an earthen pipkin, and turn them round over the fire for some time. When thoroughly mixed, the composition should be immediately removed and poured into dishes, previously wetted to prevent the wax from sticking to them. A slow fire should be used, as the quality of the composition depends upon its not being so overheated as to cause the turpentine to evaporate, and leave the wax in a brittle state.

The tools for modelling are made of box-wood, bone, or ivory; but those of wood are most approved, especially for wax tools. They are of different shapes; but those most generally required are quite thin, and slightly bent at their ends, being rounded off from the middle, which is about the size of a common black-lead pencil. Artists frequently make their own tools; but we should advise our young friends to apply to a modeller for a set; as also for wax, and any other necessary materials; all which may be kept together in a box.

The principles of this art are precisely the same as those of drawing. Deprived of the fascination of colour—form, and form alone, occupies the attention of the sculptor: if his work be deficient in this respect, it is utterly worthless; it is, therefore, his aim to rise above the mere copying of individual nature, and to erect a standard of ideal beauty—a beauty not superior to nature in the abstract, but superior to that of any individual specimen of it. Upon this principle the ancients executed their most celebrated statues, which are not mere representations of nature, but of dignified humanity, clothed in an imaginary perfection of the human form.

There are three kinds of models: the bas relief, which projects but little from its ground; the alto relief, which has a much greater projection, or is, in parts, even detached from it; and the statue, or round model, which stands independently on its own base. For the two former, a board should be provided, larger than the intended model, with a rim round it, raised at least an inch. The space inside the rim is to be filled up with well-tempered clay,

which must be struck off level, by a straight-edged strip of wood. A general outline of the subject being sketched on this clay by a pointed instrument, the embossing is commenced. Care must be taken to preserve a due proportion in the projection of the parts from the ground, as by this the whole effect is produced; and such subjects only should be selected as may be displayed without fore-shortening. An examination of medals, and of the beautiful bas reliefs of antiquity, many of which may be seen in the British Museum, will show how much it is possible to effect by very small degrees of relief.

For modelling small subjects, such as medallion portraits, in wax, a back ground of thick plate-glass, slate, or any material, having a smooth hard surface, may be used. Wax models should be carefully kept from dust while in progress: those in clay must be constantly moistened, by laying wet cloths over them, or keeping them in a very damp situation, as they are very liable to be broken after they are finished, if suffered to dry. It is advisable to have them moulded, and to get casts taken from them in plaster of Paris, by the figure-makers, before they are damaged. As we do not recommend our reader to attempt making the plaster casts herself, it is unnecessary to describe the process of producing them. Should there be any objection or impediment to this plan, the models may be preserved by baking them in a potter's kiln, by which they are rendered as hard as earthenware, and differ from it only in being without a glaze. Many specimens of models baked in this manner, at very remote periods, have been discovered in various parts of the world; they are styled terra-cottas; their colour depends upon the nature of the clay used, varying from reddish brown to white.

Medallion portraits should always be represented in profile; other positions have been attempted, but seldom with a good effect.

CASTING IN PLASTER, SULPHUR, &c.

Taking the impression of coins, medals, &c. is independently of its utility, a most interesting amusement. This art is of considerable importance to collectors of antique coins, &c. It is often difficult, and always expensive, to purchase superior specimens; of which, however, exact models may be obtained by casting, without the slightest injury to the originals, and for historical and educational purposes these casts have great intrinsic value.

The mould is made in the following manner: Take a strip of paper, a quarter or third of an inch wide; roll it twice tight round the rim of the coin, or gem, of which a cast is intended to be taken,

and fasten the end with very stiff gum-water, which will hold it instantly. Rub a very little oil, with a camel's-hair pencil, over the coin, in order to prevent the plaster from sticking; then mix some fine plaster of Paris, with as much water as will make it almost as thick as treacle; apply it quickly to the coin, on which it will be held by the paper rim. It sets almost instantly, and may be taken off in a few hours; but the longer it remains undisturbed the better. The mould which is thus obtained, is the reverse of the coin; that is, the impression is concave, like a seal. When the moulds are so dry that they will not wrinkle a piece of paper laid flat upon their surface, let them be well saturated with the best boiled linseed oil, placing the moulds with their surfaces upward, that the whole of the oil may be absorbed. They must be covered from dust; and nothing should touch their surfaces, lest they suffer injury. Moulds, well prepared in this manner, being dried about two days after being oiled, will stand a long time, for the casting of either plaster or sulphur. When used, either Florence oil, or a little hog's-lard (the latter is to be preferred), should be applied very tenderly over the mould with a little of the finest cotton wool, and the cotton wool, without lard, afterwards passed lightly over the surface, to leave as little as possible of the unctuous matter upon the mould, that the casts may be the finer. Put paper round them, as was before done to the coin; pour on plaster in the same manner, and a fac-simile of the original will be produced.

Good casts may also be made of sulphur, melted in an iron ladle, either pure, or coloured with a little red lead or vermilion, powdered and stirred up with it. The moulds and casts are made in the same manner as with plaster of Paris, only that the sulphur must be poured on the mould when hot; and water, instead of oil, must be used, to prevent adhesion. Sulphur makes the best moulds for plaster casts, and *vice versâ*,—as similar substances can seldom be prevented, by either water or oil, from adhering, in some degree, to each other. Plaster cannot be used twice; that is, old or spoilt casts cannot be powdered and again employed; for the moment the material is wetted, being a species of lime, it is no longer plaster, without being reburnt.

Another way of making casts of almost any colour, is with a strong solution of isinglass: it must be used when quite hot; and it is so thin, that a box exactly fitting the rim of the coin is required, otherwise it will escape. It may be coloured with saffron, woad, &c.

Very beautiful impressions may be taken by pouring melted wax upon the medal, which comes off easily when the wax and

metal are perfectly cold; but any one attempting this had better try it first upon a halfpenny, or other coin of small value.

Impressions may also be taken in wax, which, for this purpose, should be rendered pliable by kneading it with the hand before the fire; a little oil having been previously mixed with it. When softened to about the consistency of putty, lay it and press it close down on the coin, the form of which will then be perfectly obtained.

The following is another mode of making impressions:—Procure tin or lead-foil, as thin as possible, place it on the coin, and with a pin's head, or any small, smooth instrument, work it into every part; then take it off, revert it into a shallow box, and pour plaster into its concave side: a durable plaster cast is thus obtained, covered with tin-foil, which will resemble silver. Another mode, and now perhaps the most prevalent, is by means of the electrotyping process.

PAINTING ON GLASS.

Among those works which profess to teach the art of painting on glass, we find some in which directions are given for staining large windows in churches and halls; and the others, which merely contain the process of producing the paintings sometimes seen in cottages, or carried about the streets for sale, by Italians and Jews, representing scriptural or sporting subjects. These, we believe, were much in vogue sixty years since, as we find the mode of doing them described in all the Young Artist's Assistants of that day; which mode has been copied into similar publications up to the present time. They direct us to fix a mezzotinto print upon the back of a sheet of glass, and to remove the paper by wetting and rubbing,—leaving the impression of the print, which is afterwards to be painted in broad washes; the ink of the print giving the shadows. The picture being then turned over, the glazed side becomes the front, and the colours first laid on are of course nearest to the eye.

The methods by which glass is stained are scientific; they require a profound knowledge of chemistry, and such apparatus as must preclude the practice of this, which is the grandest, branch of the art, as an amusement. It may be interesting, however, to know the principles upon which it is performed. The glass being at first colourless, a drawing is made upon it, and the painting is laid on with mineral substances; the vehicle being a volatile oil, which soon evaporates. The sheets of glass are then exposed in a furnace to a powerful heat, until they are so far melted that they receive the colours into their own substances: enamel painting is done on

the same principle. This is a time of great anxiety to the artist; as, with all possible care, valuable paintings, both in glass and enamel, are frequently spoiled in the proving, or vitrification. The art seems to have been lost during several centuries, but it has of late been successfully revived; and large windows have been executed for churches and gothic halls, which almost vie with the fine old specimens in the cathedrals, in point of colour, while they far excel them in other respects.

The branch of the art which may be treated as an accomplishment, is the decoration of glass flower-stands, lamp-shades, and similar articles, with light and elegant designs. Flowers, birds, butterflies, and pleasing landscapes yield an extensive range of subjects, which are suitable to this style of ornamental painting. The glasses may be procured ready ground. The outline may be sketched in with black-lead pencil, which can be washed off with a sponge when the colours are dry. The whole of the colours employed must be transparent, and ground in oil; opaque, or body colours, will not answer the purpose. They may be purchased in small bladders, only requiring to be tempered with fine copal or mastich varnish, and a very little nut oil, to be ready for use. Blue is produced by Prussian blue; red, by scarlet or crimson lake; yellow, by yellow lake, or gamboge; green, by verdigris, or mineral green or a mixture of Prussian blue and gamboge; purple, by a mixture of lake and Prussian blue; reddish brown, by burnt sienna; and all the other tints may be obtained by combinations: for white, or such parts as are required to be transparent, without colour, the varnish only should be employed. A very chaste and pleasing effect may be produced by painting the whole design in varnish, without colour. It is an advantage to this style of painting, that but few colours are required; as from the nature of the subjects, and their purpose as ornaments, brilliancy is more desirable than a nice gradation of tints. The work must, of course, be carefully dried, but may afterward be cleaned with a sponge and cold water.

PAINTING ON VELVET.

Paintings on velvet are very pleasing to the eye, and easy of execution. Chair-cushions, sofas, ottomans, fire-screens, hand-screens, bell-pulls, reticules, purses, watch-pockets, and a variety of other useful and decorative articles, may be ornamented with them.

The largest and most brilliant flowers, fruits, shells, birds, &c., are well adapted to this style of painting. The colours are sold at the drawing-material warehouses, in a liquid state, and prepared for use. In addition to these, a brilliant rose colour is obtained

from the pink saucers, by dropping a little weak gum-water upon the colour, and rubbing it with a brush. A deep yellow may also be produced, by pouring a few drops of boiling water upon a small quantity of hay saffron. It is necessary to mix gum-water with all the colours made, to prevent their spreading into each other: gum dragon is the best for this purpose. The brushes used are called scrubs; they consist of a small stick, with a camel's-hair brush cut off quite short at one end, and at the other a brush of bristles of a much harder description. A small box of black lead is necessary, and a piece of list rolled tightly round, to the diameter of about two inches, to be used as a sort of brush with the black lead, for making outlines, in the manner we shall presently direct. A piece of linen rag, to wipe the brushes on, should also be provided.

The outline of the subject may be sketched in pencil on the velvet, which is of such a very delicate nature, that the greatest nicety is necessary to keep it in a state of neatness. Care should also be taken that the sketch is correctly made, as an error cannot be effaced by rubbing out, as on paper. It is a safer method, however, to make the sketch on drawing-paper, and to prick the outline very closely with a fine needle; then the velvet being previously nailed on a flat piece of wood of a proper size, the pricked pattern may be laid over it, the roll of list dipped into the black-lead powder, and rubbed regularly over the pattern from side to side, observing to touch every part, and on removing the pattern a perfect outline in black dots will appear on the velvet. Where a set of any article of the same pattern is undertaken, this is a very good plan, as it ensures accuracy, and saves the trouble of making separate sketches. Even those who have no knowledge of drawing on paper may produce a design on velvet with ease and correctness, by tracing off against a window, or by means of tracing-paper, any drawing or print which they wish to copy, and pricking the tracing on the velvet in the manner we have just described. In order to keep the margin of the velvet from being soiled in the progress of painting, a piece of thick paper should be laid over the whole, and an aperture cut in the middle, sufficiently large to expose the part to be worked on.

Each brush should be kept for that colour alone to which it has once been appropriated. A small quantity of the colour about to be used should be poured into a little cup, and a drop of gum-water added, and stirred with the stick of a pencil prior to its being taken on the brush. The mode of its application is so simple, that a short description of the execution of a single flower will suffice to give an idea of the process of painting almost any other subject on velvet. A very small portion of colour is to be taken upon the brush, and the darkest part of the leaf touched with it; the brush is then to

be dipped in water, and the colour gradually softened to the edge; each leaf ought to be coloured separately, and the darkest parts in the centre of the flowers may be finished with a small brush without softening. Indian ink is used to make the dark shadows of crimson flowers. The veins, the petals of flowers, and all the fine lines, should be done with a pen. Each leaf, as it is shadowed should be brushed with the hard end of a brush, that way of the velvet in which the pile runs most easily, and then in the contrary direction, so as to set it up again to become dry. A deeper shade should never be added to a leaf or flower until the colour previously laid on is perfectly set, or the two colours will spread and run into each other: this will be prevented by the gum, if sufficient time be allowed for each shade to dry before a subsequent one is applied.

When the piece is finished, and quite dry, it should be brushed over with a small round brush, about two inches in diameter, with hard bristles of an equal length, to raise up such parts of the pile as may have been flattened in the process of painting.

CHINESE PAINTING.

A variety of articles, such as work-boxes and baskets, screens, and small ornamental tables, may be procured at the fancy shops, made of a beautiful white wood, quite plain, for the purpose of being ornamented, by ladies in the Chinese style. The subjects generally represented are Chinese figures and landscapes, Indian flowers, or grotesque ornaments. Patterns on paper, and the colour, which is black, used in the operation, are also supplied at the same places,

Tracing-paper is to be laid over the pattern, and the outline drawn with a pencil. The tracing is then placed with the pencilled side downward on the wood, and the pattern, which will plainly appear through, is rubbed with the handle of an ivory folder, or of a penknife, so as to transfer the pencil lines to the wood. This outline must then be sketched in with a pen dipped in the black colour to be used for the ground. All the shades and lines in the design should be correctly finished by the pen, after the manner of line engraving; and the whole of the ground, or space surrounding the outline of the figures, must be covered with the black colour, laid on with a camel's hair pencil. When the painting is dry, the whole article should be finished with a transparent varnish; to perform which, however, it should be observed, that a thin coat of isinglass-size is to be passed over the wood previously to the tracing. The varnish to be used is white mastich. The general effect is very pleasing, and resembles ebony inlaid with ivory. It is also an art

very easy of attainment, and requiring but little proficiency in drawing.

LITHOGRAPHY.

A few words on the subject of the art of Lithography, we recommend to the attention of students, who are desirous of multiplying impressions of their drawings for the gratification of their friends.

The principle of the art arises out of the antipathy (if it may be so called) of grease to water. A drawing is made on a fine absorbent stone, which is imported from Bavaria, and commonly sold here at about 3*d.* per pound, with a crayon of a greasy nature; the stone is then washed with an acid, and afterwards saturated with water. It may easily be conceived, that when a printing-ink of an oily nature is applied to the surface, it will only adhere to the lines which are drawn upon it by a crayon composed of materials in affinity with itself. The stones and the *chalk*, as it is commonly, though incorrectly called, may be obtained from a lithographic printer. The *chalk* is prepared from substances of a greasy nature, and hardened by an alkali, which is extracted, after the drawing is made, by the chemical wash before mentioned: black is mixed with it merely to render the lines perfectly visible to the eye of the artist; it would print equally well though the crayon were colourless. This remark is made to impress upon the student the importance of keeping everything of a similar nature from the stone, as it will infallibly appear in the impressions: not even the coolest hand must touch this sensitive material. When the drawing is finished, the stone is to be sent to the person from whom it was obtained, with an order to print as many impressions as the artist may desire; or you may, if you please, by supplying yourself with a small press, easily print them yourself. Those who are desirous of acquiring a proficiency in this art, should procure one of the several small manuals published of late years.

ORIENTAL TINTING, OR POONAH WORK.

Flowers, fruit, butterflies, &c., from original pictures, may be executed, in a very brilliant manner, in Poonah painting, or Oriental tinting.

A piece of tracing-paper, of a peculiar manufacture, which is sold at the stationers' shops as Poonah-paper, is laid on the subject to be copied, and all the parts of one colour are marked in outline on it with a steel point; the interior of the outline is then cut out, either with a sharp-pointed penknife, or with little instruments, made for the purpose, which are sold at the shops where

drawing materials are procured. Another piece of tracing-paper is then laid on for the purpose of marking and cutting out all the compartments of another colour; and so on, until a series of frames, or formules, is obtained, each of them having apertures, through which the whole of some one colour can be laid on the paper. The principal formule is to be placed on a piece of London drawing-board, and the colour applied with a flat Poonah brush, held perpendicularly: the parts are then to be shaded from the edge as may be requisite; the colour being first nearly all rubbed out of the brush on a piece of waste paper. Each colour is to be laid on, in the same way, through the apertures of its own formule. The wings or bodies of beautiful insects are sometimes ornamented with touches of gold or ruby bronze. A little gum water, mixed with a small quantity of the gold or bronze, is laid on the paper with a brush; dry gold, or bronze, is then applied with another brush to the same part, and rubbed until it becomes smooth and polished. A small light spot is obtained by laying a drop of water on any part previously coloured, and absorbing the colour from it with blotting-paper. The rich dark specks on the wings of some insects are produced by lamp-black, laid on with a pencil. To produce a regular series of streaks, or bars, the edge of a piece of Poonah tracing-paper, cut in a proper shape, should be used as a guide to the brush. It is necessary to wash the frames, or formules, with a sponge after having used them; and separate Poonah brushes should be provided for the different colours, as well as for the various shades of each; about two dozen will be found sufficient: but a few camel's-hair pencils are also necessary to finish such parts as cannot be completed by means of the patterns in the tracing-paper,—such as small spots, minute streaks, the delicate antennæ of insects, &c. The formules for the various colours may be cut out of one piece of tracing-paper when the subject is small. The colours are the same as those in the common style of water-colours. Chromes are used for yellows: neutral tint for the dark shades, and smalt and carmine for purples; a brilliant scarlet is indispensable. A very good effect may be produced by colouring the wings of a butterfly on both sides, cutting it out neatly, gumming its body to a bouquet of flowers, in Poonah-work, and raising the wings a little from the surface. For this purpose an incision must be made in the under side of the drawing-paper with a knife, where the wings are joined to the body. In the choice of colours, the young artist should follow Nature as closely as circumstances will permit; otherwise her productions in Oriental tinting will prove offensive, rather than pleasing, to persons of taste.

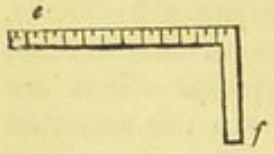
MODELLING WITH RICE-PAPER.

Rice paper is principally applied to the formation of groups of flowers, either on card-board, or affixed to small vases, baskets, &c., in festoons and clusters. The rice-paper may be procured in various colours, and intermediate tints may be made by colouring the white. Several pieces of rice-paper are laid on each other upon a tablet of lead, and the leaves and component parts of flowers are cut out with small steel punches, which may be procured, in every variety of form, at the fancy tool warehouses. A sufficient number of the different leaves having been thus formed, and placed on separate trays, each leaf is to be held by a delicate pair of tweezers, and its end affixed, with stiff gum-water, to the article to be ornamented. Thus the heads of roses and thick clusters of flowers, are formed, and fine delicate parts may be drawn in colours afterwards. Water-colour drawings are frequently made on leaves of rice-paper, for scrap-books, screens, &c. The effect of the colours, if properly managed, on this material, is very soft and delicate.

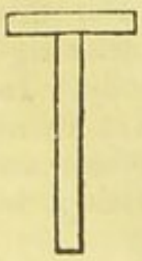
MODELLING IN PASTEBOARD AND PAPER.

The following tools will be found necessary for making boxes, and other kinds of fancy paper or pasteboard ornaments:—A parallel ruler, with a small wheel at each end, which may be purchased at any mathematical instrument maker's; a flat ruler, with brass-bound edges, to prevent its being notched when cut against: a carpenter's square (fig. 1), the sides of which, *e f*, are rectangular; consequently, by placing the side *f* against any straight line, and ruling another with the side *e*, two sides of a square are produced: by reversing its position, ruling as before, a square may be formed with very little trouble; inches, and their usual subdivisions, should be marked on the side *e*. To rule parallel lines, a T square (fig. 2) will also be found of considerable utility.

1



2



For this purpose, the paper should be fastened to a drawing-board, and the top part of the ruler placed against the edge of the board; the lines are then to be ruled by the side of the long part of the instrument, and if it be carefully moved along the drawing-board, the lines will be parallel: much of the trouble occasioned by using a parallel ruler may thus be avoided: it is requisite, however, to observe that the paper is fixed square on the board. Instead of the common

clasp pen-knives, which, being apt to slip and shut suddenly when used to cut pasteboard, are rather dangerous, we recommend knives of different dimensions, and of various degrees of strength. For the smaller sizes, the blade should be immoveable: the most convenient shape is indicated by fig. 3. In cutting pasteboard or paper, the ruler, which is used to guide the knife, should be pressed evenly and firmly on the paper; the blade must be carried as close to the ruler as possible; care being at the same time taking not to injure its edge. A pair of compases, having a moveable leg, with pencil, steel ruling-pen, and knife, to fix in, are essential implements: the knife is used for cutting out circles, so as to avoid the unevenness generally occasioned by scissors. A crimping-machine, which is formed of a block of brass, fluted on one side, with a roller of the same width and with the same sized flutes, to match the block, will be found exceedingly useful: in using it, place the paper, or whatever you wish to crimp, on the block, then press and turn the roller over it by the handles. A drawing board, made of wood, well-seasoned, and securely clamped at the edges to prevent it from warping; punches of different forms and sizes, for making holes; a pair of small pincers, a file and brass pins, for fixing the paper on the drawing-board when not strained, will also be found necessary.

3

PASTEBOARD BOXES.

As the forms of all sorts of fancy ornaments may be infinitely varied, we shall merely give examples of general principles, leaving their application, in a great degree, to the taste of our fair readers. To make a square box, draw the shape of the bottom the size the box is intended to be; and for the sides, draw lines parallel to the bottom, at the distance of the intended depth (fig. 4); the corners should be cut as shown by the dotted lines; the lines of the bottom, on the edges intended to be outward, should be cut half through the pasteboard, and turned up at right angles to the bottom; they are then to be pasted to a strip of pasteboard about half an inch deeper than the box. The lid is made exactly in the same way as the box itself, with the exception of the inner piece of pasteboard. The edges of the top are to be joined by fixing narrow ribbon on them with gum; and, for the sake of uniformity, ribbon of a similar colour should be gummed round the edges of the lower part. The top and sides may be decorated

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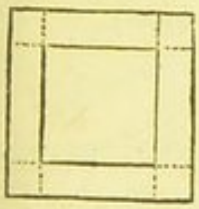


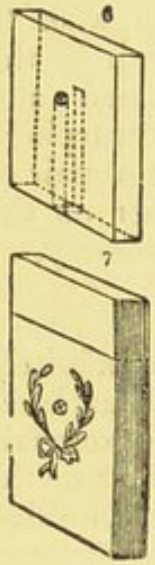
5

with drawings (fig. 5), and the corners and edges bound with strips of coloured paper, instead of ribbon.

Strictly speaking, all kinds of boxes ought to be made on a block of wood, of the shape they are intended to be: the block should be introduced before the sides are turned up, which must then be gummed or pasted together, and the whole bound and left to dry on the block; but by care and delicate handling, the absolute necessity of blocks may be superseded.

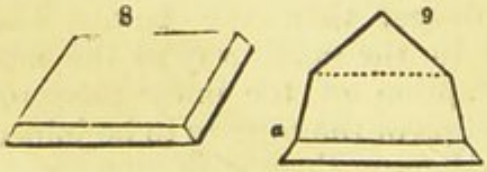
CARD BOXES.

These boxes are made on the same principle as the former, but of the shape and size of a pack of cards: they generally have a notch in the upper part to admit the thumb and finger, in order to extricate the cards. By this plan, however, in a short time, the outside cards become soiled; to remedy which inconvenience, we recommend the following method:—make an incision in the front and back of the lower part of the box, about two thirds from the bottom; pass a piece of ribbon, the width of the incisions, through each of them; fasten one end to the outside by a small bow, and at the other end attach a small button, leaving so much ribbon in the inside, that when the cards are put in, it will be flat under them, on the bottom of the box, without a crease (see dotted lines, fig. 6). To take them out, pull the small button, which will draw the ribbon straight, and, consequently, lift the cards. This contrivance may be applied to similar boxes made for any other purpose, such as to contain a beautifully bound little book, &c. (Fig. 7, the card-box.)



BASKET AND WORK-BAG.

From among the many varieties of shape in which baskets with work-bags may be constructed, we select the following:—For the bottom, a piece of card-board of an oblong shape is cut partly through, all round, within half an inch of the edge, which is then bent so as to form an obtuse angle (fig. 8); the sides are made separate, and in the shape of fig. 9; at the dotted line, and also at the line *a* below it, the card-board should be cut half through; the part below the line *a* is fastened with gum to the



upper edge of the bottom, so as to form an obtuse angle with it. Make and fix all the sides in a similar way; and when securely gummed to the bottom, fasten them together with a strip of thick paper, gummed on the inside of the edges from the bottom upward to the dotted line: the upper part above which will then fold over and form a sort of covering (fig. 10). The parts of the card-board which are cut half through, should be covered with strips of gold-paper, and the whole may be ornamented with drawings of flowers, &c. The bag should be made of silk, without a bottom, and gummed round the inside of the basket (fig. 11), which, when the bag is folded up, will completely conceal it. The bottom of the basket may be mounted on four gold balls securely fastened to the corners.

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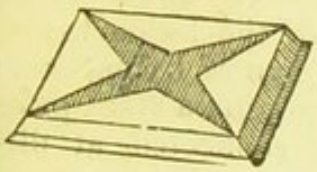

11

PASTEBOARD BASKETS.

Pasteboard baskets, in a variety of forms, may be constructed on the same plan as the boxes. One of the best shapes is that of an inverted pyramid: this merely requires considerably less of the corners to be removed than in making a rectangular box. Cut the corners as shown by the dotted lines, fig. 12; fasten the sides in the same manner as those of the boxes. The handles may be either single or double, and made to spring from the corners, or the middle of the sides; if only one be preferred, it should always spring from the middle: they are generally made of a narrow slip of card-board, covered either with gold paper or narrow ribbon, gathered very full on each side of it; the same kind of ribbon should be gathered equally full round the upper part of the basket, and small bows should be added to each of the corners. The basket may be lined and covered with coloured paper or silk, or its sides decorated by drawings, embossed gold ornaments, or otherwise, according to the taste and fancy of the artist (fig. 13, pasteboard basket.)

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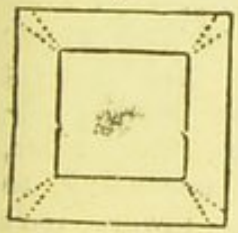

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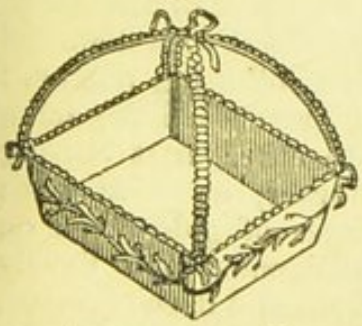

HYACINTH STANDS.

The lower part of the hyacinth stand is made of pasteboard,

on a cylindrical block; it should always be three or four inches in height, but its diameter must be regulated by the size of the glass intended to be placed in it. The interior should be lined. The four wires must arise about fifteen inches above the stand: they should be fastened in the inside before the lining is introduced. The best plan of fixing, is to glue them strongly, and afterwards to gum a stout piece of paper over them; they may be connected, at different heights, by pieces of the same material passing round them. Gold and coloured paper, cut into narrow fillets, may be turned round these wires, or they may be ornamented with sealing-wax, of different colours, melted in spirits of wine to the consistence of a thick varnish, and turned round the wires in rotation by means of a camel's-hair pencil (fig. 14, hyacinth stand).

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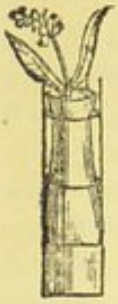

WHAT-NOTS, OR CARD-RECEIVERS.

What-nots, or card-receivers, may be made in a variety of shapes. To construct a card-receiver in the shape of fig. 15, cut a piece of card-board for the back (fig. 16); bind the edge of the upper part with gold-paper; and paste dead gold-paper, on the sides, shading it according to taste; the lower part should be bound with coloured ribbon; the front is to be formed in the same shape as the lower part of the back, and bound with ribbon; it may also be ornamented with diamond figures (as fig. 17), in the following manner:—Cut another piece of pasteboard the same size, and paste them together, first cutting the diamonds in the outer, or front one; gum small circular pieces of gold-paper on the intersections, or diamonds, and lightly shade the intervening spaces. To join the front and back together, sew stiff ribbon or silk, of half an inch or an inch wide, to the narrow ribbon, with which each of them is bound. When finished, they may either be suspended by a small piece of ribbon, gummed to the upper part of the back, or may be placed on stands, like other chimney ornaments. On the same plan, by fastening a

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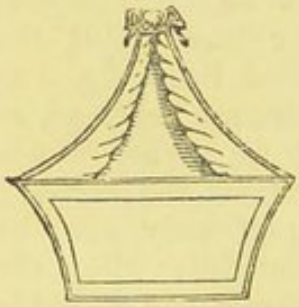

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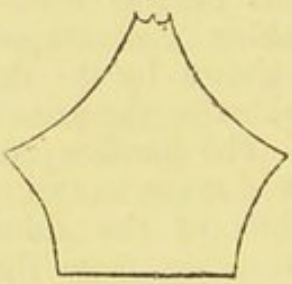

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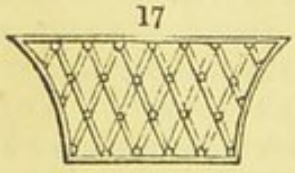

small circular box on the inside of the front, and cutting a circle out of the front itself, a stand for a time-piece may be formed.

CRIMPED PAPER HAND-SCREENS.

The paper commonly used for making these hand-screens, is glazed and coloured on both sides. Divide a sheet into three parts or equal strips, of two of which the screen is to be formed; join them into one length, crimp them with the machine, and run a thread completely through one of the edges, first putting on the other edge, which will be the margin of the screen, a narrow border of gold paper. Having fastened one end of the thread, begin to draw the crimpled paper into a circular form (see fig. 18, which shows this partially done): when the lower part, which in the engraving appears straight, is drawn by the thread into the shape of the upper part, fasten the two ends firmly together. The handles may be purchased at any fancy repository, either black or white, according to taste. The taper end, which is the part to be fastened to the screen, should be covered with paper of the same colour as the screen. Gum the handle firmly on, taking care that it cover the part where the paper is joined; it should extend, for the sake of strength, to some distance beyond the centre. For the purpose of entirely concealing the junction on the centre, gum a star, or some other pretty and appropriate ornament, on each side of the screen: one or two bows of narrow ribbon may be put on different parts of the handle, by way of finish. The two ends of the paper should be so contrived, that the handle, being neatly and firmly gummed on one of them, the other may wrap securely over, without showing where they are joined (fig. 19).

18

19

TRANSPARENT SCREENS.

Draw on rather a thin piece of drawing-paper, any kind of figure, animal, or small composition; for instance,—a boy holding a mouse in a trap, with a dog jumping up towards it. The design should be sketched very lightly, without any dark shadows. Trace it exactly on another piece of paper, line for line; then, by adding a

frock, bonnet, curls, bracelets, &c., the boy may be changed to a girl; particular care being taken to keep the entire outline of the boy on the folds, &c. of the girl's frock: or the mouse-trap may be converted into a cage, by lengthening the bottom; the mouse into a bird, by the addition of plumage; and the dog into a cat, by putting a longer tail, rounder head, &c. Again, should the first drawing be a boy blowing bubbles, by the addition of an old hat, longer skirts to the coat, a little beard and a few wrinkles, and blending the bubbles into a little cloud, an old man, smoking his pipe, may be produced. When the second drawing is finished, cut it out neatly, and paste it at the back of the first, with great care, so that the lines of the original, and the copy which has received the additions, may be exactly opposite each other. At the back of these, paper is to be pasted on, and the production may then be used as the interior, or centre ornament of a screen. When it lies flat on the table, or if placed against the wall over the chimney-piece, with the front exhibited, the first picture only is seen: when held against the light, or fire, it changes into the second. The taste and ingenuity of the artist will, doubtless, suggest a variety of designs, which will be more elegant in the original, and more amusing in the change, than those we have mentioned. In accordance with our plan of leaving as much as possible beyond the general mode of operation to our readers, we refrain from suggesting any other subject. Handles may be added, similar to those of the screens we have before mentioned, and they may be ornamented in the same way. To strengthen the paper part of the screen, a thin piece of wire, covered with gold paper, should be fixed round its edges.

LANDSCAPES, ETC., ON TRANSPARENT SCREENS.

Landscapes, that will appear like beautiful sepia drawings, for the embellishment of screens, may be made in the following manner:—Draw, and then cut in paper, any kind of building, taking care to keep it in good perspective. On the parts where the shadows fall, paste pieces of paper, varying in thickness according to the depth of the shadows, from coarse brown paper to thin post. Round the mouldings of the windows, &c., paste narrow slips; and, if the requisite depth of shade should not be produced, paste other slips, of equal or less thickness, until the part is deepened to the proper tone. Foliage, water, and clouds, may be very effectively indicated by the same means; the shape of their shadows being cut out and pasted on as above directed; and where these shadows become deeper, other pieces of paper of a less size are to be cut out and pasted on as before; thus, not

only the mere masses, but all the variations of light and shade, may be produced; as, also, the nice gradations and soft blending of one into another, as well as the abrupt projections. A moonlight view produces the best effect when the shadows are sufficiently strong, which may be ascertained by holding the work opposite a good light. Paste it between thin paper, and at the corner from whence the light proceeds put a round spot of oil or varnish, to imitate the moon. The landscape may also be improved by putting a little varnish round the edges of the lightest parts with a camel's-hair pencil. It may be formed into screens, and decorated and strengthened in the manner described under the head of Transparent Screens. It is scarcely necessary to observe, that the landscape can only be seen when the screen is held up between a light and the spectator: nothing, however, must be drawn or fixed to its surface; but the edges may be elegantly embellished.

EMBOSSING ON CARD.

Various devices of flowers, leaves, wreaths, &c., may be embossed on card-board, for the purpose of forming ornamental borders, groups of flowers, centres of hand-screens, &c., by raising the design on the surface of the card with a pen-knife. The subject should not be sketched in pencil, as it would be difficult to rub out the outline afterward without destroying the embossing; but the blunt point of a tracing-needle may be employed for this purpose. The penknife should be held in a sloping, or nearly flat position, with the edge towards you; and the flowers are formed by making a series of slanting incisions in an oblique direction, so as to raise the face of the card a little. A stalk may be formed by cutting a series of waving lines; small rosettes, or flowers of a star shape, are made by small circular incisions; leaves, like those of the fern, are composed of one long incision down the middle, and a succession of short ones up the sides. In cutting rosettes it is better to hold the knife still and move the card round: an infinite variety of forms may be produced by varying the length and shape of the incisions. Care should be taken not to cut through to the back of the card, and the penknife must be of that kind which is called sabre-pointed.

PIERCING COSTUMES ON PAPER.

Turkish or other figures, in Oriental costume or draperies, are produced by a combination of water-colour painting, for the features, with a series of small punctures made with needles of various

sizes for the dresses. The face, hands, and feet, being first drawn and coloured, the outline and folds of the drapery are marked with a tracing-needle, the paper is then laid on a piece of smooth cloth, or a few sheets of blotting-paper, and the punctures inserted in the folds of the dress, from the front to the back of the paper; the drawing is then laid with its surface downward, and the interior of the various outlines filled up by punctures made with a very fine needle from the back to the front of the paper. It sometimes affords a pleasing variety if the costume be wholly or partially coloured, as it relieves the monotony of the white. Needles of various sizes should be used at discretion, and the whole of the back-ground or body of the paper painted in some sober opaque colour, to throw up the figure.

CHARADE FLOWERS.

Cut a piece of any coloured paper in an oblong form. Rule a very light pencil line along the middle of it, lengthwise, and taking the centres in that line, describe segments of circles completely across the paper; fix the compasses again at the opposite side of each segment, and join the two extremities (fig. 20); the segments on one side of the paper must then be neatly cut out, and the whole piece creased by the hand. Run a thread through the part not cut out, draw it into a circle, and thus the form of a flower will be obtained. Make a handle of wire, and fasten it to the flower, covering the seam, which will be in the centre, with a piece of paper representing the central filaments of the flower. The wire should be covered with thin green paper or gauze, twisted into the shape of a stalk; at intervals introduce a leaf or two, formed likewise of green paper, with a thin piece of wire up the centre to preserve the shape and resemble the stem (fig. 21). Before creasing the flower, charades, enigmas, &c., should be written on each of the imitative petals. The artist may carry her representation of flowers, on the above principle, to a very considerable extent. She may use double, or even treble paper, placing one piece behind another; and by a judicious selection of colours may copy, not merely the shape, but the various tints of the flowers. She will show her good taste by imitating, as closely as possible, the colours of her original, instead of substituting red for lilac, blue for green, or yellow for vermilion, &c.

20

21

An immense variety of other elegant and useful articles may be constructed of pasteboard and paper; indeed, the application of the art is so extensive, that it would be impossible for us to afford space for describing an hundredth part of the various works in those materials which have fallen beneath our notice. The elementary principles of the art may be sufficiently acquired by constructing the articles which we have described, to enable the young artist to copy others, or to fabricate and embellish novelties of her own invention. Working in pasteboard is by no means restricted to trifling productions; very elaborate and exquisitely-finished architectural subjects, ingenious models of the most delicate works, grottoes, trees, &c., and even views on an extensive scale, may be admirably executed in parchment or paper, either in a plain state, or coloured to imitate the objects represented. The attempt to describe the mode of constructing such a class of works would be fruitless; proficiency in this amusing, and we may venture to say instructive, art, is only to be attained by practice, taste, and natural ingenuity.

Several of the boxes, baskets, &c., classed under the subsequent heads of the Ornamental Artist, are constructed on nearly the same principles, and some of them partially made of the same material as many of the articles described in the preceding pages; from such, therefore, the reader will derive a still further insight into the art of working in pasteboard.

MODELLING IN GLASS.

With a little ingenuity, very neat and elegant boxes, and other ornaments, may be constructed of glass, the parts being bound together with ribbon in such a manner as to produce a very pleasing effect. Boxes may be made in a variety of forms, according to the inclination and taste of the artist; we shall commence by giving directions for making one of the most simple shape.

OBLONG GLASS BOX.

Procure from a glass-cutter the following pieces of ground glass: four in an oblong form, of precisely the same length and breadth, for the top and bottom, back and front; and two others, equal in depth to the back and front, and in breadth to the top and bottom, for the ends. It is indispensable that all the pieces should be cut with accuracy, otherwise it will be impossible to put them together so as to produce a correct shape; the artist should, therefore, send patterns in pasteboard, the accuracy of which she

has previously proved. The next step is to bind the edges of each of the pieces with narrow ribbon. The mode of doing this is very simple; begin at one corner of the glass with one end of the ribbon, and thence carry it round the entire edge of the piece of glass, until it is brought to the corner from which you commenced, where the two ends must be neatly and firmly sewn together. It is necessary to bring the ribbon round as tightly as possible, and to keep the edges of the glass in the centre of its breadth. Having done this, the ribbon is to be pressed down on each side of the glass; it should then be plaited at each of the corners; the plaits must be fastened with a stitch or two of silk; and when the last of them is done, the inner edges of the ribbon will be stretched so as to lie close to the surface of the glass, which will thus be completely and securely bound. Silk of precisely the same colour as the ribbon should be used in sewing the corners, and the ribbon should be kept tight and stitched securely at the plaits, otherwise the box, when complete, will not be sufficiently firm to retain its shape.

All the pieces, being bound in this manner, are to be successively stitched together in their proper situations by the bindings. The stitches are only to be inserted at the corners; they must be drawn tolerably tight, and may be concealed by little bows of ribbon or rosettes. The box is then to be mounted on small knobs or pedestals of ivory or wood, pierced round their upper edges, and fastened with sewing silk to the binding of the four corners of the bottom, to the interior of which a cushion of wadding or wool, covered with quilted silk, may be tacked. The back part of the lid, after being bound, is to be stitched at the corners to those of the back; thus hinges of sewing silk will be formed. To lift the cover, a bit of ribbon, terminating in a bow or rosette, must be tacked to the centre of its front binding; and for the convenience of suffering it to remain open, the cover may be prevented from falling back by two pieces of ribbon of equal length being tacked to the corners of the front and the front corners of the lid. The box is now complete, and will form rather an elegant ornament to the toilet (fig. 1).

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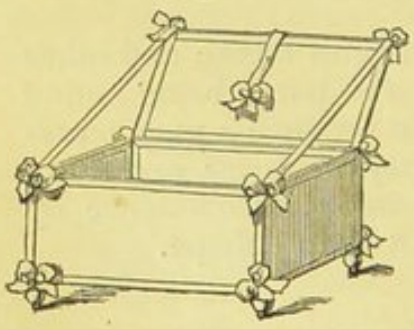

GLASS BOXES WITH RAISED COVERS.

A box, very superior in appearance to the foregoing one (which

we have described rather on account of its simplicity than for any beauty in its shape), may be made with a very little additional trouble. Let the bottom be cut square; the front, back, and sides of equal lengths, but rather less in depth than the breadth of the bottom. The pieces are to be bound, fastened together, mounted on pedestals, and ornamented as the box before described. The top consists of five pieces of glass; four of them cut as fig. 2—being as broad at *a* as the lower part of the box—and the fifth a square, having all its sides equal to the breadth of the other four at *b*. The five sides are to be bound and fastened together at the corners, each of the large pieces forming one side of the cover, and the little square one, being fixed to them by their upper edges, constituting its top. All the corners are to be ornamented with bows or rosettes, and the cover fastened on with a ribbon to raise it, and others to prevent it falling back, in the manner before described (fig. 3).

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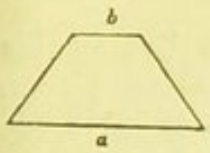

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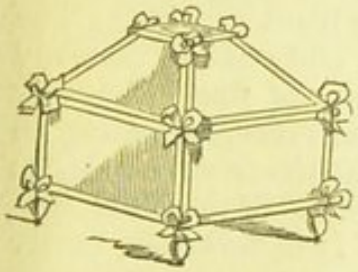

TEMPLE, OR COTTAGE BOXES.

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The covers of these may be made to resemble in shape the roof of a cottage or temple. In the former case, the lower part of the box must be longer and rather narrower, and the cover be made of four pieces only; two in a triangular shape, as fig. 4, *a*, for the ends, of the same breadth at the bottom as the ends of the lower part of the box; and two others, as *b*, for the sides, equal in length to the sides of the box, and in depth to that of the sides of the triangular pieces. If it be intended to make the box in the form of a temple, the lower part may be cut in a square or an oblong shape, either in front or at the sides. The top is made nearly as the preceding one, except that triangular pieces of less depth must form the front and back, as fig. 5, *c*, and broader pieces for the sides of the box, as fig. 5, *d*.

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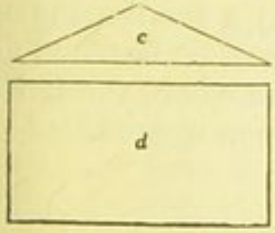
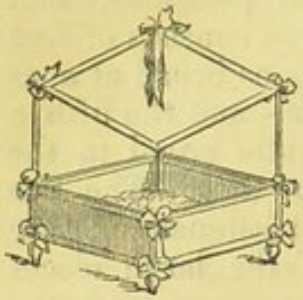


DIAMOND BOXES.

Another variety of shape is the diamond. For a box in this form, the front and back must each consist of two oblong pieces, cut exactly alike. They are first to be joined together at the edges, and then fastened by their lower binding to the sides of the bottom, which should be diamond-shaped, and having each of its sides equal to the length of each of the oblong pieces for the front and back. The cover may be either flat, and cut in a diamond shape, or it may be made of four triangular pieces, of equal size, and corresponding in breadth with the pieces at the front and back; it should be tacked to the corner, in the centre of the back, and the two stays fastened to each end (fig. 6). It is, however, better to make it moveable.

6



OCTAGON BOXES.

The octagon is a very graceful form for a glass box; its bottom must be shaped as fig. 7, *a*, and its sides equal squares, as *b*, or oblong, as *c*, to match the edges of the bottom. The cover may be flat, and made of a single piece resembling the bottom, or it may be raised, as the top of the temple or cottage box; in this case, it must consist of eight triangles, the base of each of which should be equal to one of the sides of the bottom, as *d*. Instead of bringing them to a point, which is rather a difficult task, it is advisable to cut off the ends of the several pieces, as *e*, and fit in a small octagon at the top. The cover may be fastened at the corners of one of the sides, and the stays fixed where the artist discovers they will best keep it in equilibrium when opened.

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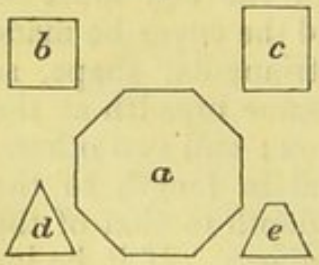

HARLEQUIN BOXES.

When the fair artificer—to use an old writer's phrase on a very different subject to that on which we are now treating—hath travelled thus far; when she is able to make boxes in the forms we have described, she may vary the shapes as well as ornaments. A harlequin-box may be made in any form we have described, or even in a more complicated one; it should be bound with ribbon

of any two different colours, which, when placed in juxta-position, will be gratifying to the eye of taste. The binding on one edge should be one of the colours selected, and that of the binding to which it is tacked of the other; so also should be the upper edge of the box and the lower edge of the cover. The rosettes, or bows, must exhibit an union of the two colours; a third may even be added; or they may be made entirely of one colour, different from, but still harmonizing, or judiciously contrasting with, those of the binding. It is necessary to observe, that the colours must be selected with judgment, otherwise they will make the box a mere showy, vulgar gew-gaw.

BOXES WITH BINDINGS IN VANDYKES AND SCALLOPS.

Vandykes and scallops may be made in the bindings of the boxes, either when the ribbon is only of one, or when of two or more colours; for this purpose it must, however, be rather broader than in other cases. The vandykes or scallops may be cut before or after the binding is sewed on. Taste and propriety must govern the artist in the application of these ornaments; she would render herself obnoxious to criticism, were she to scallop the binding of a diamond-shaped box, and also—but the offence would not be so great—were she to vandyke that of an octagon. In all cases it is proper that the ornaments should in some measure correspond with the shape. A box in the form of a temple, for instance, would look ridiculous were it to be vandyked, and set off with parti-coloured rosettes; while vandyke bindings and ribbons of various colours would be legitimate ornaments for one of a diamond shape. A temple-shaped box should be bound with ribbons of one colour only.

BOXES WITH BEAD OR SHELL TRIMMINGS.

Beads, bugles, or small shells, may be used to ornament the edges of glass boxes. The beads, or bugles, should be strung on silk, and then tacked round the edge of each of the pieces of the box, so that, when put together, two rows of beads or bugles will appear at every angle. If shells be used, they must be gummed to the bindings, in regular order, after the box is put together.

MIRROR AND PINCUSHION BOXES.

Looking-glass may be employed for the sides, front, and corners of the box, instead of ground glass, and the edges ornamented

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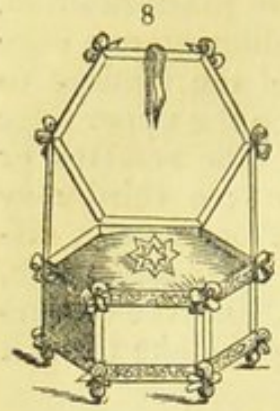

with strips of embossed gold paper; or a piece of looking-glass, as large as the bottom of the box, may be bound and embellished in a similar manner, and fastened inside the top, by tacking the corners of its binding to that of the lower edge of the cover. The mirror-box, if made in the latter way, should stand open, and the cushion may be made into a pincushion, by stuffing it with sufficient wool or wadding to raise the top of it to the edges of the box, and covering it with plain, instead of gathered silk (fig. 8). The centre of the cushion may be ornamented with a bow, or rosette; or if the binding be vandyked, and of two colours, with a star (fig. 9), formed of the two ribbons used for the binding, decreasing gradually in size, and pinned through their centres. The cover of the pincushion may also be made of triangular pieces of silk of different colours, to match with the harlequin binding.

9

PAINTED-GLASS JEWEL-BOXES.

We shall now proceed to describe a glass box, superior in beauty, as well as size, to any of the preceding; in the embellishment of which the artist may exhibit specimens of her talent as a painter on glass. The best shape for a box of this description is an octagon. The bottom may be made of wood, entirely covered with silk; and the pedestals should be firmly screwed or glued to it, by the person from whom the wood is procured. Each of the sides should have one or more figures painted on it, in striking and beautiful colours. A fine shell may be depicted on one side; a bird with brilliant plumage on another; a flower of lively hue on a third; a gorgeous butterfly on a fourth, &c. (fig. 10). But all these, as well as any other pictorial embellishments, should be drawn and coloured from nature, or good copies, and not endowed with forms or hues by the caprice of the artist; who may depend, that however fine her imagination may be, she can never equal the variety, excellence, and harmony of nature. The side should be bound with ribbon, of a colour

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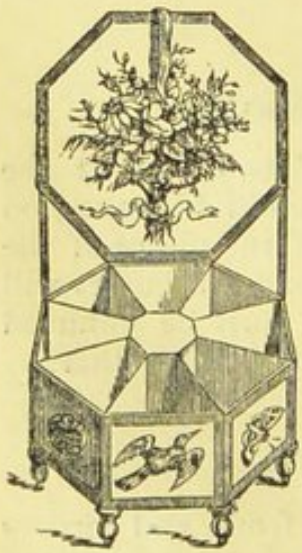

that will accord with, but not subdue the paintings: they are to be tacked firmly to the silk that covers the bottom, which ought to be well strained over the wood. For better security, a wire covered with silk or ribbon, and accurately bent into an octagon shape of the proper admeasurement, and fastened at the ends, may be carried round the inside upper edge of the box, and sewed to the bindings. Compartments may be made of pasteboard, covered with puffed silk, over wadding, or wool, placed in the interior, and tacked to each other and to the binding. A better plan, however, is to make sides to the compartments of pasteboard (fig. 11), covered with plain silk of a light gray colour, to resemble the ground glass on the outer side; and on the inner, with puffed silk, like the rest of the lining. The compartments and sides should be pasted securely together, so as to be independent of the glass box, into which they may be placed without difficulty. The cover may be made of one entire piece of strong ground glass, well bound with ribbon, and embellished with a group of shells or birds, or a bouquet of flowers, with butterflies or brilliant insects among their leaves. Should a raised top be preferred, it is to be made of an octagon shape; for the construction of which, directions have been given in a previous page. A wire may be added to the bottom of the cover, similar to that at the upper edge of the box; and all the sides should be painted to correspond with those below. Any other shape may be adopted for this kind of box; but the octagon, or hexagon, is to be preferred.

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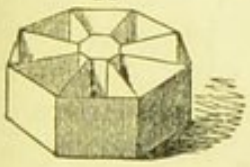

ENGRAVED-GLASS JEWEL-BOXES.

These are made as the preceding boxes; engraved glass being substituted for painted, stained, ground, or plain. Pieces of glass may be purchased at any of the fancy shops, with different subjects engraved upon them. There is no very great difficulty attendant on executing the engravings; but the operation is rather dangerous, unless performed with care, and by an experienced person. We cannot recommend our readers to attempt it: it is, therefore, unnecessary to describe the process.

The engravings ought not to be a jumble of landscapes and single figures,—a bust on one side, and an extensive view on the other; but all of them should be of the same character. The ornaments should be simple, and the bindings by no means gay.

HARLEQUIN AND MIRROR JEWEL-BOXES.

The jewel-box may be made entirely, or in part with looking-glass, embellished with gold on the bindings, and having a set of pasteboard partitions suitable to its form, which is to be governed by the fancy of its maker. The harlequin jewel-box may be hexagon, octagon, diamond, or even oblong, with its front and sides formed of triangular pieces, bound and sewn together (see fig. 12). Whatever may be its form, the harlequin jewel-box should be made of stained glass, the various pieces being of different colours; but judgment and taste must guide the constructor, in selecting them, as well as in the choice of ribbons for the binding: the latter should be vandyked, and finished with very small stars at the corners.

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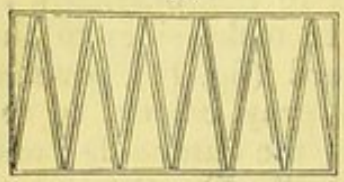

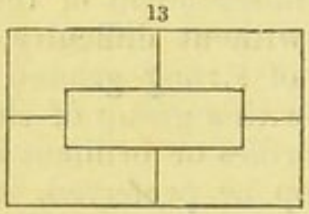

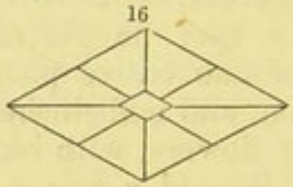

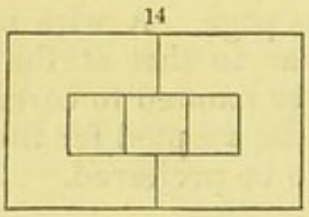

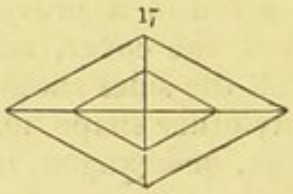

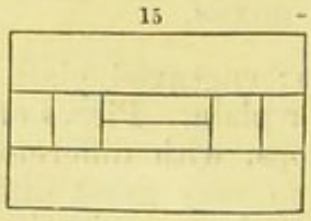

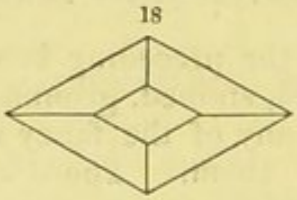

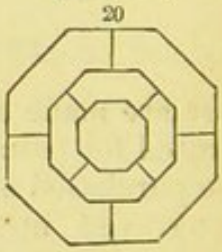

The divisions in the interior of the harlequin and mirror, as well as all the other glass boxes, may be made to suit the convenience of the owners; but the compartments should correspond with the shape of the box: thus,—if the box be octagon, the divisions should be somewhat in the same style; should its length exceed its breadth, they ought to assume the oblong form; if it be diamond, the triangular. The character of each may be easily maintained, and the size of the compartments, at the same time, be accommodated to the shape of the articles they are intended to receive (figs. 13, 14, 15, oblongs; 16, 17, 18, diamonds; 19, 20, octagons; 21, hexagon).

The plans of each variety of shape are not restricted to those above delineated; they are merely specimens which may be greatly diversified, without losing their respective general characters of shape.

GLASS JEWEL-BOXES, WITH PAINTINGS ON VELVET.

These are to be made in the same manner as the painted-glass boxes; except that, instead of ground, plain plate glass must be used. They afford an opportunity for a tasteful display of the artist's talent as a painter on velvet. The subjects chosen should be similar to those mentioned for the designs on ground glass. The velvet paintings are to be stitched to the corners of the binding of each piece of glass, before the box is put together; it is to be entirely lined with silk previously to the partitions being inserted. The bindings should be of the most chaste and delicate colours. The observations as to the cover, &c. of the painted-glass boxes, apply to these, which perhaps excel any of the boxes we have hitherto described. A box may be made in this manner on the same, or a smaller scale, for a splendid pincushion; for this purpose, a case to fit the interior, made of stout pasteboard, and well stuffed, should be inserted, and covered with a piece of velvet, on which a group of shells or flowers is painted; and on the inside of the cover a piece of looking-glass should be fastened, bound and ornamented at the edges with dead gold paper, embossed, scalloped, or plain, according to the fancy of the artist.

GLASS PICTURE-FRAMES.

A frame for a picture, or case for a bust, may be produced from four pieces, cut as *a* (fig. 22), bound, and sewn together at their ends, *b b;* a piece, as *c*, which will serve as the glass in front of the picture or bust, fastened by its binding to the inner edges of the pieces, *a;* four other pieces, as *d*, which are to be sewn together by the bindings at their ends, and then fastened in like manner, by the inner edges, to the square formed by the pieces marked *a;* four more, of equal size, to form the bottom, top and sides, which are to be fastened to the outer edges of the pieces, *d;* the centre glass must be depressed, and the inner pieces of the frame placed in a slanting direction towards it: the outer parts, *d*, forming an obtuse angle with them, and being placed square on them and the sides. A portrait in stained glass, a small painting on velvet, or a miniature; a beautiful medallion, or a

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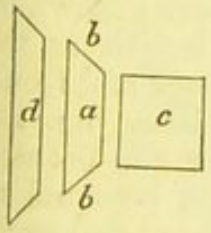

bust in wax, may now be put behind the glass (fig. 23), and the frame or case completed, by adding a back of stout pasteboard or wood, bound and sewn to the edges of the sides. The bottom, top, and sides of a case for a bust must be deeper than those for a frame; and so also should the parts *a;* the inside of the back must be lined, and have a small shelf or pedestal fixed to it, for the bust to rest on; any appropriate ornaments may be placed at the corners, to conceal the seams. If a frame, a loop may be fixed in the back to suspend it by; and if a case, pedestals may be fastened to the bottom, which will be more convenient if made of wood. The piece, *c*, in front of the picture or bust, should, of course, be plain plate glass; the front, sides, &c. may be ground, stained, or of looking-glass.

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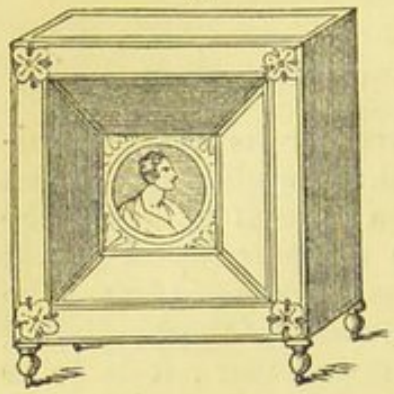

GLASS BASKETS.

Baskets in a variety of elegant forms, adapted both for use and ornament, may be constructed of glass, ribbon, &c. on the same principles as boxes. To describe, or even enumerate all the shapes in which glass baskets are made, would be needless, and encroach upon our limits: they admit of almost every combination of figure, and afford a good opportunity for the display of taste and elegance in their construction. We shall offer a few select patterns only, which may be copied with advantage; and various improvements may be made upon each of them, before any decidedly new combinations of form are attempted.

For the first shape which occurs to us, the following pieces of glass are to be procured: a front and back, matching exactly with each other, as *a*, fig. 24; two ends, as *b*, the sides of which must be of the same length as the two lower sides of the back and front, represented in dotted lines (fig. 24, *a*); an oblong piece for the bottom, the sides of which must be equal to the lower edges of the front and back, and its ends equal to those of *b;* and two other oblong pieces for the covers, the sides of which must be of the same length as each of the upper edges of the front and back, *a;* and their ends equal to those of the side pieces, *b*. The front, back, sides, and bottom of the box are to be fastened together by means of narrow ribbon, in the same manner as the

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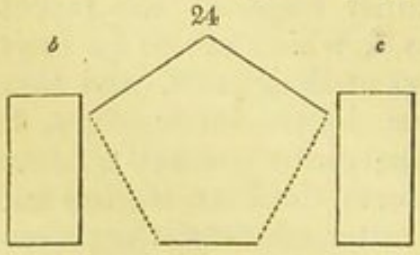

different parts of glass boxes; a piece of stout wire, covered with silk, is then to be fixed by its ends from the upper point of the back to the upper part of the front; and to this wire the two covers, *c*, after being neatly bound with ribbon, are to be fastened by the upper corners of their binding, either with hinges of strong silk or fine tough wire. The handle may be made of pasteboard, strengthened with wire, covered with silk, and sewn by its ends to the upper points of the back and front.

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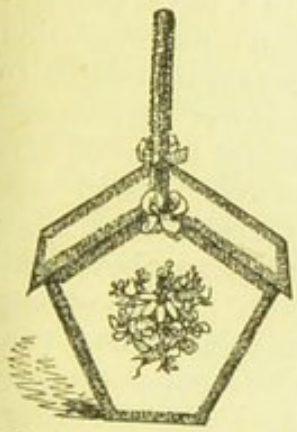

The interior of the basket may be lined with puffed silk and wadding, or in any other manner that fancy may dictate; all the edges of the lower part of the basket, the covers, and the handle, should then be furnished with fringed ribbon, or fringed silk, tacked to the binding; and if the glass be plain, a fine medallion, encircled by a wreath of roses, &c. in wax, or rice paper, or a fine bouquet of flowers only, may be gummed to the centre of the front and back pieces (fig. 25). Transparent glass may also be used, and the interior parts decorated with paintings on velvet; or the various pieces which compose the basket may be formed of painted instead of transparent or plain ground glass. The edges and handle may also be ornamented in a variety of modes, and with various neat and elegant trimmings.

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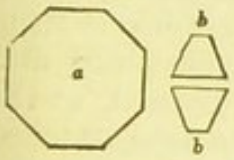

A basket of a more difficult construction may be made in the following manner: procure, for the top and bottom, two octagon pieces, as *a* (fig. 26); and for the sides, which are formed of an upper and a lower series, sixteen pieces, as *b b*; the narrow edges of all these must be equal to the several sides of the top and bottom pieces, *a*; being first separately bound with narrow ribbon, they are to be tacked in pairs by their wide ends, and then fastened together by the sides of each pair; the bottom piece is also to be bound and fixed in the usual manner to the ends of the lower series of side pieces. The top must be fastened with silk ribbon or wire hinges, by its binding, in such a manner that it may fall upon and rest on the inside of the edges of the upper series of side pieces. The handle may be formed of pasteboard and wire, covered with silk, and sewn firmly to the edges of the basket (fig. 27).

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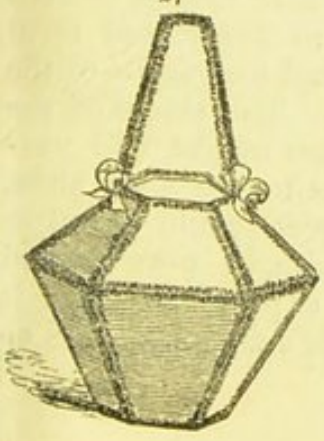

The whole of the binding, and the sides of the handles, may then be ornamented in the same manner as those of the basket first described; the glass may be either plain, ground, painted, or transparent, with small paintings on velvet inside; the lining may be puffed or plain, according to the fancy of the maker.

Another basket, which may, by some persons, be considered of a superior form is made precisely in a similar way to the one we have just described, with this addition; namely—that a row of oblong pieces, equal in length to the upper edges of the lower series, and the lower edges of the upper series of side pieces, are carried entirely round the centre of the basket, fastened to each other by the ends, and to the pieces above and below them, by their sides. These oblong pieces are usually ornamented with a running pattern, worked in rice paper on their surface, on velvet inside them, or otherwise, according to the taste and powers of the artist (fig. 28).

28

A very elegant basket may also be made in an octagon or hexagon shape, with the sides cut as in fig. 29: these may be bound and fastened together in the manner we have before directed in other cases; or ribbon may be gummed round the edges of each piece, and when dry, other slips of ribbon may be fastened to them with gum, so as to connect the side pieces at *a* with the respective sides of the bottom, in the manner of hinges; ribbons are then to be attached to the points *b b*, of the pieces forming the sides; by means of which they are to be tied together, the fastenings being made to assume the forms of elegant bows; a piece of whalebone, with ribbon twisted round it, or otherwise decorated, according to fancy, will form the handle: it is to be bent over the basket, and tied down to the bows, by which the side pieces are fastened. The shape of the basket may be varied by making the side pieces longer and narrower than fig. 29; in this case it is advisable to use plain glass, lined with paintings on velvet. If the side pieces should be cut as fig. 29, or still broader, the basket will, of course, be more flat and open; and as the inside of it will be most exposed to view, it should be handsomely lined with puffed silk, or made of stained or painted glass.

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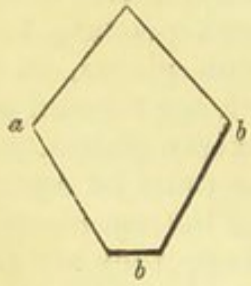

Common glass may be used for baskets; it may also be made to resemble ground glass, by gumming or pasting *crêpe lisse* entirely over the surface of one side. The ribbon is then attached to the edges, as before described, letting its edge on one side neatly cover the edge of the *crêpe*. Paintings may be executed on the *crêpe lisse* with water colours—a little gum being mixed with the water used in the process, to prevent the colour from running. One colour must be allowed to dry before another is laid over it.

Various other elegant ornaments may be formed of glass, as allumette cases, what-nots, &c., by applying the principles laid down in the foregoing descriptions. These and their decorations we leave to the reader's ingenuity and taste; as, were we to describe the numberless articles which are, or might be formed of this beautiful material, and the combinations of ornament with which they may be embellished, our task would be almost endless.

MISCELLANEOUS ORNAMENTS.

Under this head we purpose offering to our readers descriptions of the modes of making baskets in worsted, allspice, lavender, straw, &c.; screens, of different materials; working in gold threads bead, bugles, &c.

WORSTED WORK-BASKET.

This basket is composed of a frame, or skeleton, made of round bars of wicker-work, and entirely covered with worsted. The frame (fig. 1) must be obtained of a basket-maker. It is to be worked all over with worsted, in several shades, of any colours that taste may suggest; as, for instance, five or six of the intermediate tints, from dark brown to a pale yellow colour. A double quantity of the darkest shade but one will be required, for covering the handles and rims: for this purpose, a quantity of the worsted is placed, doubled, in a netting-needle; and with it the two lower rims are wound round as closely as possible, so as to avoid showing the wicker between, and yet so regularly that the threads do not lie over each other: these are then to be wound with the next shade lighter, doubled and entwined spirally, and about an inch apart, merely as an ornament. The handles are

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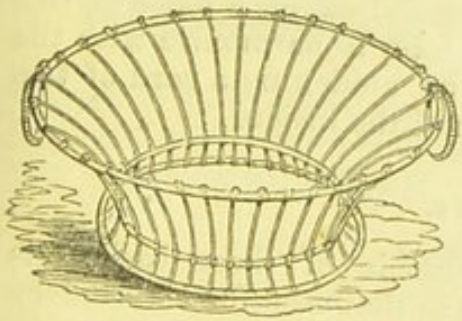

done in a similar manner. The side of the basket should then be marked, up one or more bars, with a pen, into twice as many equal parts as there are shades of worsted. The work is then to be commenced at the bottom by entwining the darkest colour round the bars, in the manner we shall presently describe, to the extent of one division; the lighter shades follow in succession to the middle, where they are to be gradually darkened again to the top. The mode of winding the worsted on the sides is very simple: the proper shade is taken in the netting-needle single, and having tied the end to a bar, the needle is passed from the inside of the basket over the next bar; the worsted is entwined round that bar, brought inside the basket again, passed over the following bar, and thus round the basket until it is entirely covered; the space between the two lower rims should be covered first, in two of the lighter shades. The ends of the different shades must be tied together with great neatness, so that the knots may not be seen; and with care, lest they become untied after the basket is finished. The inside of the basket will be perfectly smooth, and the shape of the bars will appear on the outside. The upper edge of the basket may be ornamented with fringe, composed of loops made by netting a portion of each shade of the worsted on a thread of strong silk, with a mesh of three quarters of an inch wide, keeping the loops close together, so as to produce a very full and rich appearance. The top rim must be measured and divided into three parts, and each third subdivided into as many parts as there are shades in the worsted used for the sides, and all the shades should occur successively in each of the three parts. The netting is wound round closely, but not too tightly. The different shades are to be netted separately; and as each shade is wound on, the end of the silk on which it is netted must be tied to the beginning of the next. The bottom of the basket should be a piece of stiff pasteboard, covered on each side with satin to harmonise with the shades of the sides; the stitches may be hidden by a cord of two shades of twisted worsted sewn on round the inside.

MOSS-BASKETS.

The appearance of moss on the outside of these baskets is produced by worsted of the same kind as that used for embroidery in worsted. Four or five shades of green, and as many of brown, in regular gradations, should be selected: the darkest shades of green being of an olive tinge, and the lightest of a yellowish hue, in preference to grass green, which has not the mellow autumnal tint of the colours before mentioned. One skein of each colour is sufficient for a pair of baskets. The shape, or body of the basket,

is formed of pasteboard; it is usually round or oval, and made with or without a handle across, according to fancy. The pasteboard shape is covered, inside and out, with green silk; and if a handle be affixed, it should be sewn on, outside, where the joining will be covered by the moss, so that the silk may appear neat within. The worsted of each colour should be wound into a separate ball, and knitted, either flat, or round like a stocking; a piece of thread should then be passed, by means of a needle, through the last row of loops, or stitches, and fastened at each end, in order to prevent the knitting from unravelling. The worsted should then be thoroughly wetted or soaked in warm water, and placed in an oven of gentle heat until perfectly dry. After this, the respective pieces must be unravelled and made up into small bunches, which are to be sewn so thickly on the silk, with which the outside of the basket is covered, as to leave no apparent spaces between them. Each bunch should be composed of about three shades of colour, made up in the following manner: The several pieces of knitting being selected, a few rows of each are to be unravelled, and all the ends being taken up at the same time, are to be held between the thumb of the left hand and the side of the hand, as low and near the joint as possible: the upper part of the thumb being then slightly relaxed, the worsteds are, with the right hand, wound round the thumb and finger of the left hand, like a figure of 8, and held in that position while the middle (including the ends with which it began and left off) is sewn together with a piece of silk. The bunches should be placed in heaps according to their respective shades, and sewn on the basket according to taste, intermingling the hues so as to avoid the appearance of formality. The handle is covered with bunches of the worsted in the same way as the body of the basket (fig. 2).

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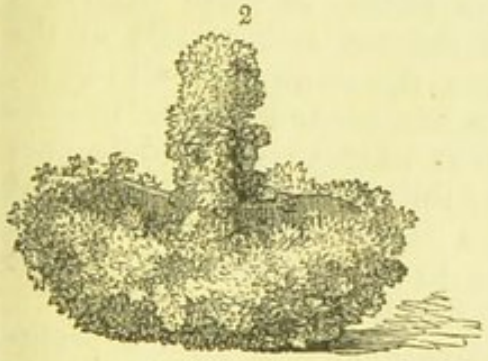

STRAW BASKETS, TEMPLES, ETC.

Procure some bundles of whole round straws, of precisely the same length and thickness, from a straw-bonnet manufactory.

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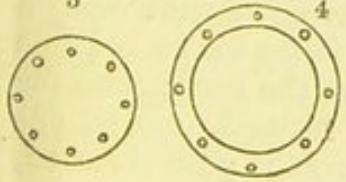

If you determine that the shape of your intended basket shall be round, cut out a circular piece of pasteboard for the bottom (fig. 3), and another, rather larger, for the upper part (fig. 4): cut the interior of

the latter entirely out, leaving only a margin about half an inch wide. Cut all the straws the length you intend the depth of the basket to be; for this purpose, use a sharp pair of scissors, of rather a large size, and handle the straws very delicately, as the least rough usage will split and render them totally useless. With a punch, the exact size of the straws, make holes all round the middle of the pasteboard meant for the upper part of the basket, and also precisely the same number round the edge of the bottom, keeping them about a quarter or half an inch distant from each other according to the size of the basket,—those at the top being more distant from each other than those at the bottom. Then take the straws, one at a time, and introduce one end of each into the margin of the top, and the other into the bottom part of the basket, leaving about half an inch projecting at each end beyond the pasteboard. If the straws should be too small for the holes, they may be fastened by a little gum. A handle may be formed of pasteboard, gummed on, and decorated with gilt ornaments, or bound over with straws pressed flat. The beauty and strength of the basket may be increased by entwining ribbon among the straws; thus producing a kind of chequered work (fig. 5). One variety of these baskets is made by forming the top and bottom of the same size, and when the straws are all put in, the top and bottom are twisted a little, in contrary directions, so as to make the middle part appear smaller than the sides. Should the artist decide on making a straw basket of any other shape, the foregoing directions are to be attended to without variation, except as regards the form of the top and bottom.

5

To make a cottage or temple ornament, cut out a piece of pasteboard for the bottom, as for the baskets, arranging the shape according to taste, and introduce the straws for the sides, in the same manner as directed for making baskets; and, if making a temple, leave a considerable space at one part for the entrance. For the roof, if a cottage, bend a piece of thick drawing-paper into the proper shape, and along each side of it make holes for the admission of the straws, which form its sides; pass each straw of the latter through the holes made in the former, which, if well arranged, will hold it firmly together: by leaving a wide margin to the roof, it will overhang the sides, and form the eaves. Press some straws flat, and gum them on each side of the roof; and for the two ends, or, as they are technically termed, gables, cut pieces of drawing-paper to the shape of the roof; gum them on,

and ornament them in any fanciful way, either with straws or otherwise (fig. 6). A chimney may also be made of coloured pasteboard, and let into the roof. A good effect may be produced by forming the sides of a cottage with Bristol-paper, painting the doors, windows, &c., and introducing it into the interior of the cottage; when, if it be well contrived, the straws will appear as a portico round it. Very small artificial flowers, imitating woodbine, &c., may be introduced among the straws, and will greatly add to the beauty of the whole. The roof of a temple, whether it be round or hexagonal, is to be constructed in a similar manner to that of a cottage: form the pasteboard on the same principle; gum the straws on the same way; and, to finish it, add an acorn, or any other little ornament, to the top.

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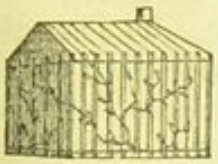

LAVENDER BASKETS.

These are made, like straw baskets, of pasteboard; but, instead of a straw, two or three stalks of lavender are to be introduced. The appearance of these, when lined with silk, or interwoven with ribbon, is very elegant; they likewise possess the advantage over straw baskets, of diffusing a most pleasant odour. The centre of the stalks of lavender, between the top and bottom, may be bound with very narrow ribbon, of a delicate and appropriate colour, neatly finished in rosettes, or little bows, in front. They may be made in a variety of forms (fig. 7).

7

ALLSPICE BASKETS.

The allspice berries should be steeped in brandy for some time, to soften them, and then perforated with a small borer. These are afterwards strung on a slender wire, sufficient to form the circumference of the bottom of the basket, and the ends neatly twisted together with a pair of pliers, and formed into a round or an oval, at discretion. Wrought gilt beads strung between the berries very much improve the general effect of the basket. The interior of the bottom is composed of wires strung with the berries, and crossing each other so as to form diamonds or any more fanciful shape. The first row, for the sides, consists of a series of small arches, fixed at their bases to the bottom circle, by twisting one wire round the other. The second row consists of another series of arches, the bases of which are fixed in a similar way on the

summits of the first row; a third row, in the same manner, completes the height of the basket. A series of semicircles, or bows of wire, strung with the berries, is then fixed to the top row, so as to project over the sides of the basket: from the extremities of these are hung festoons of the berries, strung on silk. The handle is made of two wires, strung as the others, and crossing each other so as to form a succession of diamonds. It is proper to string the berries as the bending of the wires proceeds, and where the wires cross each other, or appear to do so, a larger gilt bead should be introduced. The interior of the basket is lined with doubled satin, gathered at top and bottom, and pulled in puffs through the arches in the sides. The whole is ornamented with ribbons and bows, according to fancy. (Fig. 8, Allspice basket.)

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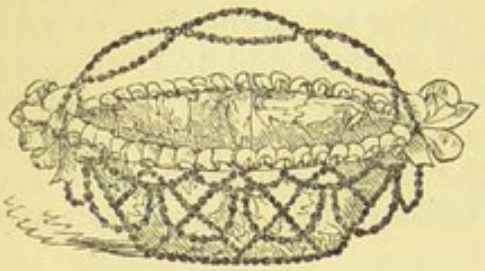
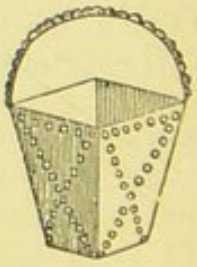


Cloves may be similarly treated, and almost any kind of ornament made with them.

WAFER BASKETS.

Make a basket of Bristol-paper, of any shape you please, as fig. 9 for instance; then with good wafers, of different colours, form stars in the following manner, to decorate them:—Cut a wafer in halves, wet the straight edge of one of them, and stick it directly across the centre of a whole wafer; divide others into quarters, and fasten six of such quarters to the whole wafer, in the same manner as the half one, at equal distances, so as to form a star of eight rays (fig. 10). When a sufficient quantity of stars are made, wet the bottoms of the whole wafers, and arrange them with taste on the basket, so that the exterior of it may be nearly covered (fig. 11).

9 10 11



A handle may be formed of a strip of Bristol-paper, decorated in the same manner; or, rather, with small rosettes of narrow

ribbons, of various colours, if it be intended to be handled (fig. 11).

FEATHER BASKETS.

Take the quill feathers of any bird whose plumage is variegated or beautiful; for instance, that of the pheasant: remove the bottom or quill parts, and introduce the feathers to a piece of pasteboard, pierced for their reception, and cut to whatever form you may think fit: bend a piece of wire into the same form, but rather larger than the bottom; fix the ends together, and fasten the feathers to it at regular distances from each other (fig. 12). A handle of wire, or pasteboard, covered with a portion of skin with the feathers on it, may be added. The basket should be lined with coloured silk, or gold paper.

12

ALUM BASKETS, ETC.

The method of encrusting baskets with alum is very simple; but success depends, in some measure, upon chance, as the crystals will frequently crowd together in one or two parts, and leave others uncovered. Dissolve a quantity of alum in so much water, that rather less than half of it will be sufficient to cover the basket. As much alum as can be dissolved must be put in, so as to make what is called a saturated solution, which must be poured into a saucepan, or pipkin, and slowly evaporated, or boiled away, until less than half of the original quantity remains; it should then be removed from the fire, and poured into a jar of a convenient shape: the basket is to be immersed in it, and the jar, with its contents, set aside to cool gradually; care being taken that it is not shaken or moved, otherwise the crystals will not form regularly.

The basket, or whatever else is intended to be covered, must have all the parts equally rough; so that if wire be used for making the shape, it should either be filed, or covered all over with worsted; common willow baskets, however, answer the purpose best. To obtain a group of crystals for a mantle-piece specimen, any rugged substance answers for a nucleus: a cinder, or a peach-stone, are among the best. The crystals may be coloured yellow by boiling a little saffron or turmeric with the alum; and purple, by a similar use of log-wood: the deepness of the shade, of course, being regulated by the quantity used of the dyeing material. Whether the alum be employed in its simple state, or any colouring matter be added, it is requisite to filter the solution

through blotting-paper before it is evaporated. The beautiful deep-blue rhomboidal crystals of sulphate of copper, or blue vitriol, as it is commonly called, are more elegant than those of alum, and are produced precisely in the same manner.

RICE OR BUGLE BASKETS.

These baskets are made of card-board, and afterwards ornamented with rice. The best shape to make the basket is that of an inverted cone without a top, the sides being cut into diamonds: line it throughout with paper, or silk, of any agreeable colour, and gum grains of rice on the intervening spaces of the card-board. Should the effect of the rice appear monotonous, vary it with coloured beads, &c.; or bugles alone may be employed, instead of rice. Baskets of this description may also be very elegantly decorated with groups of small shells, little artificial bouquets, crystals, or the fine feathers from the heads of birds of beautiful plumage.

LAVENDER FAGGOTS.

For making these, the lavender should be procured before the flower is blown, and used while the stalks are fresh and green, otherwise they will break in making up.

About twenty heads of lavender should be placed evenly together, the leaves and small buds that grow beneath the head having been first removed. One end of a narrow ribbon, of any bright colour, should be tied round the whole tightly, close under the heads, so as to form a bow, and leaving the remainder of the ribbon about a yard long. The stalks are then to be bent backwards over the heads of lavender, and the ribbon being first doubled, or folded over, to make it narrower, must be wound round the faggot spirally; passing it, alternately, over two stalks and under the next two, until the heads are covered; the end of the ribbon is then cut off and fastened in, among the heads, by tying another ribbon in a bow round the stalks, which should be cut off about two inches below the last bow (fig. 13). A plain description of lavender faggot is made by simply tying the heads as before, bending the stalks over, placing them regularly round the heads, and tying the ends together, but omitting the spiral ribbon (fig. 14). It is usual to make up a quantity of these faggots with variously-coloured

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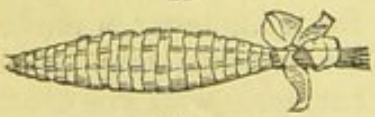

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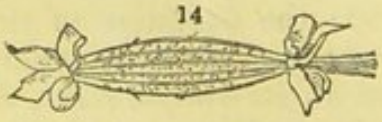


ribbons, and to place them in ornamental baskets of glass or moss.

IMITATION-CHINA SCENT JARS.

Take a common vase, similar in shape to one of foreign china, or a grape jar, and cover it entirely with widow's lawn, which may be fixed on by paste or gum. Cut flowers or figures out of chintz that has a good Indian pattern, and ornament the jar with them, arranging them tastefully in groups. Procure from a turner a lid and stand to match the jar, and cover and ornament them precisely in the same manner. The jar, cover, and stand, are then to be varnished by a painter.

Another mode.—Take a prettily shaped tumbler or vase of clear glass; the thinner the better, then place within it a coloured engraving, of a porcelain pattern, cut to shape; bind the glass and paper together at the top with gold-paper edging by means of gum; and put a narrow strip of gilt paper at the bottom, so as to conceal the glass effectually. The paper will not fit, unless it be cut into two pieces; and where these two pieces join at the side, put a strip of gold paper on the outside, to conceal it. Some paint a little device on the side opposite the painting; and others prefer putting in coloured paper. A piece of rather stiff white paper, a little larger than the bottom of the tumbler, cut at the edges, so as to be bent up round the sides, should be put in at the bottom; if you touch the edges of this piece with paste, it must be done very lightly; for if the paste runs down, and gets between the glass and the paper, it will make sad work. When it is finished, not one in a hundred could tell it from French china, without close examination. A tumbler one size smaller may be placed inside, for water and flowers; but great care must be used in filling it, lest the water run over the edge and spoil the engraving.

POTICHOMANIE.

This is somewhat similar to the preceding; but instead of lining the vase with paper, you cut out the coloured flowers or figures, which are sold in sheets for this purpose, and fasten them in by carefully gumming the coloured surface. The interstices are subsequently filled up by a coat of paint, which must only be laid on when the ornaments are thoroughly dry. The colour of the ground may be green, blue, pink, or any shade used in real porcelain vases.

DIAPHANIE.

This art is a kind of offshoot of Potichomanie, which gives only opaque effects, while Diaphanie produces diaphanous or transparent ones. It would be too long to enter here into a detail of the process by which it is accomplished; we shall, therefore, merely state that Diaphanie is especially applicable to window-panes, which may be painted in imitation of stained windows—a charming improvement to a house any of whose back windows have an unpleasant look-out; to window blinds, screens, Chinese lanterns, and many other articles.

The materials, designs, brushes, prepared gum, cleaning liquid, washable varnish, &c.—are sold, with instructions, at Barnard's, 339, Oxford Street, and many other places.

FEATHER SCREENS.

These screens are composed of the wings of birds; and, if the plumage be selected with taste, are superior to almost every other description of screen.

The first process, in forming the screen, is to cut, with a sharp pair of scissors, through the skin in the inside of the wing, in the direction of the bones. The skin is then to be turned carefully back from the shoulder to the second joint; but the bones composing the part above that are so small, and the skin adheres so closely to them, that it is necessary to detach them at the first joint, and remove them with the flesh. The skin is then to be stretched straight upon a board with a weight placed upon it. The same process must be gone through with the sister wing. When perfectly dry, place their straight edges in close contact, and sew the skins, as far as the second joints, together. If the skin should be thin, it will be requisite to enclose a strip of card-board, thin wood, or wire, in the place of the bones which have been taken out: these will not only keep the screen extended, but serve also as a firm substance, to which the handles may be fixed. The seam, and the place where the handles are inserted, must be concealed on both sides by stars of gold-paper, or bows of ribbon; but the most beautiful and appropriate ornaments for this purpose are circular, oval, or lozenge groups of feathers selected from the head or the breast of the bird to which the wings belonged (fig. 15).

15

GAUZE SCREENS.

These screens are made of gauze, stretched over a frame of wire, and ornamented with figures, which are usually cut out of chintz. The handles, as well as the shapes, are merely of wire, bent and fastened in various modes; they may be purchased, at a moderate price, from the fancy-ornament sellers. The gauze must be doubled, stretched lightly over one side of the wire frame, and neatly sewed at the edges, which should be bound with gold or coloured paper. The ornaments, such as flowers, birds, &c., cut out of chintz, are to be gummed on the front of the screens; but should a difficulty occur in procuring a variety from chintz, an engraving, rather gaudily coloured, will answer the purpose. Artificial butterflies, and other insects, look well, if fastened to the gauze by their bodies, with their wings extended. Flowers, also, gummed by their calyces and stems, with their petals free, produce an equally good effect. The handles are bound over with ribbon and decorated with bows.

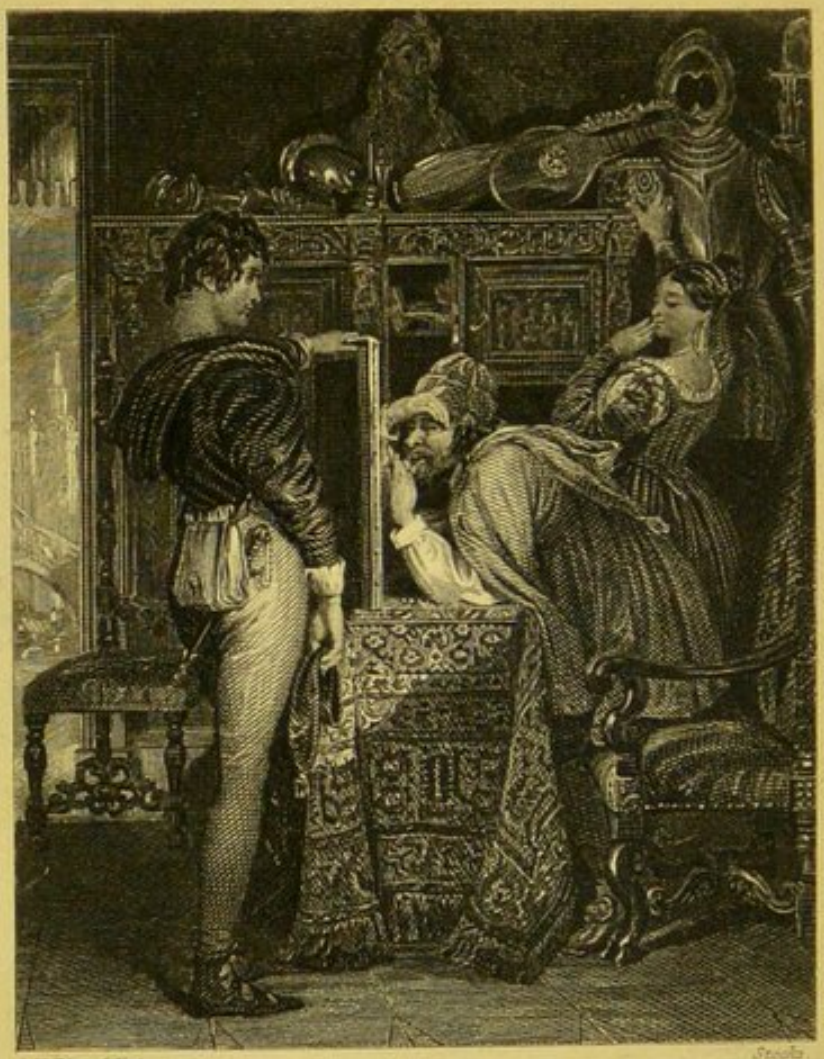
GOLD-THREAD PURSES AND RETICULES.

The thread is to be procured at the gold-lace shops: a small loop is formed at the end of it; then, with a tambour-needle passed through that loop, the thread is drawn up again into another loop; and thus, in succession, until such a length has been woven as, the two ends being joined, will form the circumference of the purse. The joining is effected by passing the needle through the two end loops, and drawing the thread up through both; then five loops are to be formed on the continuation of the thread; after which, the needle is passed through the third loop from the join, on the completed circle, and the thread drawn through; five more loops are then formed on the perfected round, as before, and so on in the same manner, until the circle is finished. The succeeding rows are formed by weaving, as before, and so on in the same manner, until the circle is finished. The succeeding rows are formed by weaving, as before, five loops at a time, and then passing the thread through the thread, or centre loop, of the row last finished; the rounds are still continued until the desired size is obtained. The bottom is completed by drawing the loops together with gold thread, and affixing a gold-bullion tassel. The top is finished by a straight row of running loops, sewn with gold thread to a spring clasp. The lining should be of satin, and rather smaller than the net.

ARTIFICIAL FRUITS.

Artificial fruit is usually made of wax, cast in plaster of Paris moulds, and coloured after nature. As every fruit is, more or less, of a circular form, it is impossible to take a mould of it in a

single piece: if an apple, for instance, be cased in plaster, the mould cannot be removed in an entire state; it must, therefore, be taken in two pieces; and, if the fruit abound with irregularities, in three, or more. It would be impossible for us to describe the mode of making the necessary divisions, which must entirely be governed by the figure of the fruit. A little experience will enable the young artist to judge in what manner, and in how many pieces, the mould of a fruit can be taken. The plaster must be mixed to about the consistence of treacle; and if the subject can be taken in two pieces, having first lightly oiled its surface, one half of the fruit is to be covered with the plaster, the edge of which is to be made smooth with a knife. When the plaster is nearly dry, a few notches are also to be made in the edges, into which, when the other part of the fruit is covered, the plaster will run, so as to make the two pieces exactly fit each other. The mould being completed by laying the plaster on the uncovered part of the fruit, it is to be removed when dry, and soaked for a considerable time in cold water, the parts being kept together in their proper place by binding round the whole with string. The wax having been first kneaded with the hand, and then melted to the consistency of cream, is to be poured into the mould at the opening caused by the stalk of the fruit. When sufficiently hardened, cut the string which binds the mould together; remove the pieces with care, and an exact model of the fruit will be obtained. The colours must be procured in a finely powdered state, and may be laid on with the finger, except the more delicate parts, which should be touched with a camel's-hair pencil. For many fruits, however, the colour may be mixed with the wax, and when this is the case, the powder is only applied to give the proper bloom, which, in many fruits, may be imitated with great success. Should any difficulty occur in fixing the powder, hold the wax model a short distance from the fire, and in a few minutes the desired effect will be produced.

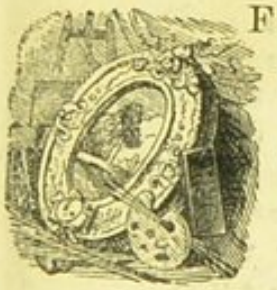


M.T. Elton A.R.A. Stocks

SALVATOR ROSA
in his Studio.

PAINTING.

This is an art akin to Nature's self,
So mighty in its means, we stand prepared
"To see the life as lively mock'd, as ever
Still sleep mock'd death."



F all those attainments, which contribute as well to the gratification of the senses, as to the refinement of the taste, and the enlargement of the intellectual powers, the art of Painting is, perhaps, the best adapted to the female mind. The satisfaction derivable from the contemplation of a beautiful work of art, possesses a peculiar advantage: it is renewable at pleasure, without any continuance of the exertion by which it was produced. But a rare combination of talent with industry, or, at least, great industry, can alone lead to productions which may claim admiration beyond the circle of our own partial relatives and friends. Experience has proved the impracticability of conveying a knowledge of the elementary principles of this art, in any manner, so as to supersede the useful labours of the drawing-master; yet there is much to be learned before the pupil can go alone with confidence, after the period when his attention ceases, and which the limited duration of his lessons cannot include: to this we must attribute the fact, that so many, who make a fair progress under the master's

eye, either never attempt any performance with the pencil, after he has ceased to superintend and direct their studies, or finding themselves embarrassed at the outset, abandon the pursuit, and fancy "their genius does not lie that way." We will presume that our readers have gone through the usual elementary course of instruction; that they are able to copy, with accuracy, the outline, at least, of any object which may be set before them: this, and much more, may be obtained by any person of moderate abilities, by industry, without an iota of that much-misunderstood quality, genius, which has proved an ignis fatuus to thousands. One of the greatest artists this country has produced, was right when he said, "Nothing is denied to well-directed industry; nothing is to be obtained without it." Depend, then, wholly upon your own exertions; and listen rather to the criticisms of the judicious, than to the praises of those who will flatter you with assurances, that you possess intuitive excellencies, which may render application unnecessary. To recommend a proper course of study, will be the most useful purpose to which these few pages can be devoted; for it cannot be dispensed with.

Before any attempt be made beyond copying, the student is enjoined to acquire a clear view of the leading principles of perspective, on pain of committing absurdities, for which no beauty of colour can atone: it will be found less difficult than is generally imagined. Although it would be impossible to compress into our limits all the explanations and diagrams necessary to an illustration of its theory, we shall subsequently offer a few observations, which, we trust, will prove beneficial to the student.

The minor considerations of materials and preparations for study are not unimportant. An easy position of the body is not only conducive to health, but leaves the mind disengaged for the occupation, which, for the time, should engross it. The subject to be copied must be placed directly before you, and the pencil held with freedom. Never omit straining your paper, on a flat board, framed together so as not to warp: this may be done by damping with a clean sponge, which expands the paper, then pasting or gluing down the edges, and suffering it to dry gradually; but a neater method is to use a *drawing-board*, with a separate frame, which, as it may be had at any of the shops dealing in artists' materials, it is unnecessary to describe.*

* Amongst the many excellent improvements in artistic materials of the present day, are sketching-tablets on blocks, to be procured of all artists' colourmen, and which for drawings of a moderate size, supersede the necessity of straining paper. These tablets consist of a body of paper compressed, so as to form in appearance a solid block; each sheet, however, can be separated by the introduction of a penknife at the space left in front of the tablet, and by passing the knife carefully round the edge of the paper.

In a useful little 'Guide to Water-Colour Painting,' by R. P. Noble, published by

The first point to be determined, either in copying from a picture, or from nature, is the horizontal line, or that height in the picture with which the eye of the painter is supposed to be exactly level. In the representation of a flat country, this is placed at one third of the height of the picture.

The extent of the subject to be included in a drawing from nature, will require the next consideration; and this is found to be as much as can be contained in an angle of about fifty degrees, or as much as can be conveniently seen by the eye in a fixed position, without turning the head: nevertheless, objects may often be introduced from a greater distance, as trees, &c., to improve a composition, especially when no importance is attached to the identity of the scene.

There are two points to which we would particularly wish to call attention, because they are errors that greatly retard the progress: one is a want of command of hand; the other, an impatience to produce a finished effect, without the systematic and gradual process necessary to the production of a good picture. To remedy the first will require great attention and practice, if the uncertainty of hand, or timidity of touch, exist in a great degree. It is never found among the artists of necessity, with whom quantity of production is an object of importance, such as decorative painters, and designers for manufactures: with these, freedom and precision of hand are seldom deficient. We advise the pupil to study well every line before it is begun: to determine its exact course and bearing; in short, to look from the object to be represented, to the surface on which it is to be drawn,

George Rowney and Co., Rathbone Place, London, we find the following clear direction for stretching a water-colour drawing already in progress: "If a drawing requires restretching, it should be carefully wetted on the back, so that it may imbibe a sufficient quantity of water without disturbing the colour on the other side. Next prepare a piece of common cartridge paper by sponging both sides until it is well soaked. This piece should be greater by one inch every way. Cover it to the breadth of three quarters of an inch all round with a layer of paste; lay this pasted side on a common deal board that will not warp, and press it flat with a cloth, taking care there are no air-bubbles between it and the board. Now paste the back of the drawing all over, and lay it down in the middle of the cartridge paper, cover it with a piece of dry paper, and rub it smartly with a cloth; this will insure the adhesion of every part of the drawing to the paper beneath it. Remove the dry paper, and allow the drawing to remain one or two days; it can be removed from the board by cutting at the distance of an inch from the edge of the cartridge paper.

"This is a useful contrivance, as it makes the drawing firm, and gives importance to it, at the same time that it makes it perfectly flat. This process also throws out much of the colour that may have disappeared, or sunk into the paper from too great absorption."

Cold-pressed imperial paper is, perhaps, the best for landscape. The rough imperial and double elephant have each advantages, but much of course depends upon an artist's fancy, and what is the object and character of his work. Pale gray and stone tints are useful for water-colour studies, as well as for studies in pencil and chalk.

As delicacy of drawing will be a scrupulous aim, we trust, of all our readers, we would especially recommend to them the use of smooth and delicate surfaces.

again and again, until the mind's eye transfers it, and the imagination sees it in the place it is to occupy: that is the moment to be seized; and then the quicker the line is drawn the better. Large objects should be copied on common sheets of paper; it is a great check to the freedom of the hand, to have the materials so delicate or costly as to produce any degree of fear about spoiling them. This advice, however, must not lead you into an opposite extreme. Remember, always, that correctness is the first principle of the art. An occasional hour or two would not be misspent, if occupied in drawing straight lines, perpendicularly; diagonals, parallel to each other; and circles without the compasses. This observation is applicable to many who would be ashamed of being seen so employed; who have, in fact, begun to make pictures, without sufficient practice in the rudiments of the art. The second error is even still more common, from the infant who lisps his petition for "a box of colours to paint with," to the "children of a larger growth," who waste their time in shading or colouring, upon an outline which might mean anything. There is no period, in the progress of a picture, when the forms of objects can be so conveniently improved, as while they are in a faint outline: a thorough conviction of this, and experience of the pleasure of modelling, as it were, into substance by shadows, and adding the charms of colour to well-studied forms, will render patient labour less irksome, by anticipation of ultimate success.*

* We extract here from Mr. Ruskin's 'Elements of Drawing,' some valuable hints for observing graduations of light and shade.

The author, after recommending to his pupil the practice of filling-up, on smooth white paper, a small square with pen and ink in very fine crossed lines, until it assumes a delicate and one-tinted tone, "like a square patch of gray silk or cloth cut out, and laid on white paper," proceeds to say:

"As soon as you find you have some command of the pen as a shading instrument, and can lay a pale or dark tint as you choose, try to produce graduated spaces, the dark tint passing gradually into the lighter ones. Nearly all expression of form in drawing depends on your power of graduating delicately; and the gradation is always most skilful which passes from one tint into another very little paler. Draw therefore two parallel lines for limits to your work, and try to graduate the shade evenly from white to black, passing over the greatest possible distance, yet so, that every part of the band may have visible changes in it. The perception of gradation is very deficient in all beginners (not to say, in many artists), and you will probably, for some time, think your gradation skilful enough, when it is quite patchy and imperfect. By getting a piece of gray-shaded riband, and comparing it with your drawing, you may arrive in early stages of your work at a wholesome dissatisfaction with it. Widen your band little by little, as you get more skilful, so as to give the gradation more lateral space, and accustom yourself at the same time to look for gradated spaces in nature. The sky is the largest and most beautiful; watch it at twilight, after the sun is down, and try to consider each pane of glass in the window you look through as a piece of paper coloured blue or gray, or purple, as it happens to be, and observe how quietly and continuously the gradation extends over the space in the window of one or two feet square. Observe the shades on the outside and inside of a common white cup or bowl, which make it look round and hollow; and then on folds of white drapery; and thus gradually you will be led to observe the more subtle

In your early practice of drawing from solid objects, it would be well to make several studies from a white globe, placing it in different lights, and having only one window in the room. You will find, that there is but a single spot upon it which can be represented by perfect whiteness; and that all the other rays falling obliquely upon a receding surface, a weakened light is received, diminishing, at last, into absolute shadow, until again relieved by reflection from surrounding objects on the opposite side. For a globe, a billiard-ball may be used; a cylinder may be made of a roll of writing-paper; an egg will serve as an oval; and a cone may be obtained by rolling up a sheet of paper in the shape of an extinguisher. Thus the models are easily obtained; and the pupil has but to study them well, and she will imbibe all the principles of light, shadow, and reflection. She may then proceed to the plaster bust, which must be kept perfectly clean and free from dust, as discolorations greatly embarrass an inexperienced practitioner. The outline should be sketched faintly, at first, with soft charcoal—that made from the willow is best—the superfluity of which may readily be removed from the paper, by a light whisk of the handkerchief, or even a feather: this should be repeated till the pupil is satisfied with the form and proportions, when chalk may be used. The paper selected for this style of drawing is of various tints—brown, blue, or pale gray; the latter is our favorite colour, as it forms the most natural medium between the black and white chalk. The soft French chalk is the best for general purposes; and the Italian chalk, which is harder, for finishing, or where great neatness is required.*

As the general proportions of the human figure may be found

transitions of the light, as it increases or declines on flat surfaces. At last, when your eye becomes keen and true, you will see gradation on everything of nature. If you can procure any pieces of dead white porcelain, not glazed, they will be useful models."

* In schools of art, Italian chalk is now universally used.

It may be as well to mention here, a preparation of india-rubber called 'Green's American Ink Eraser,' which may be purchased of all artists' colourmen, and at most stationers' shops. This preparation is extremely useful in softening and erasing false lines, or lines too dark in pen-and-ink drawings, in pencil, chalk, or even in water-colour drawings, being sharper and harder than ordinary india-rubber, yet not so sharp as a knife. By rubbing down with the nail, or with the flat-side of the eraser, an entirely smooth surface may be restored to the paper after the application of the edge of the eraser. To remove a sharp light, a narrow pointed slip may be cut off from the eraser and used as are the small bread "stumps," which students in chalk-drawing know well how to make, by rolling small portions of rather moist bread between their finger and thumb till they form a point.

A student in the Female Manchester School of Design has warmly recommended the use of *baked* india-rubber as a substitute for bread, and remarks that it is much used at present by her fellow-students.

Neither india-rubber, baked or unbaked, nor yet the invaluable ink-eraser can supersede the use of clean bread-crumbs (not over stale), for the softening of the entire outline of a sketch or drawing in chalk or pencil, in its earliest stage. When a clean but delicate outline is required throughout the whole, bread crumbed and rubbed very gently

in all books upon drawing, we shall not here detail them elaborately; but merely give those which must be constantly borne in mind, or referred to in designing.

The *human figure* is measured by a scale formed from the length of the head: in a full-grown person, the whole height is generally eight heads, or ten faces. The head is subdivided into four parts, each of which is the length of the nose; and the arms, when extended, will cover a space equal to the whole length of the figure. The breadth varies according to the age, strength, and other characteristics, of the person. The hand is the length of the face; and the length of the foot is generally one-seventh part of the whole height. These proportions must not be understood to apply strictly to every human figure; but are deduced from the measurement of several antique statues, the acknowledged standards of ideal beauty. Although these general proportions must be known, they are only useful, as the rules of grammar are in language, for reference in cases of doubt: it would be impossible to draw a figure solely by the application of them; in almost every position, some of the limbs come under the influence of fore-shortening, and measurement is impracticable. The technical term foreshortening, expresses the greatest difficulty a student in drawing has to encounter; because, although dependent upon geometrical principles, no practical rules can be laid down for its execution: it is the art of representing, in perspective, an infinite series of curved lines, occasioned by the development of the bones and muscles. There is but one mode of acquiring skill in this, which is the grand characteristic of a master in the art of design, and that is, practice —long and patient practice from the same figure. We will suppose a statue,—as the Apollo Belvidere, in which one arm is extended: it should be first drawn in either of the side views, in which there is no fore-shortening, until the student is well acquainted with the length, substance, and anatomical development of the arm; it should then be so placed, that the arm advances toward the eye of the spectator, and be drawn in that position. These exercises should be varied and continued, until the student can, by means of her pencil, give a clear idea of a part advancing or receding without the assistance of shadow.

In the study of the human figure, heads, hands, and feet being the parts most frequently developed, and possessing the greatest

over the whole paper with the fingers and palm of the hand, will soften the whole outline of the drawing at once, and equally without injury to the paper, and swept away from the drawing board with a piece of clean, soft linen, will leave the drawing in an inviting state for delicate progression.

It may be, perhaps, needful to warn inexperienced students of the necessity of great care in avoiding any stray streak of butter which may inadvertently have been left upon the piece of bread cut off for the purpose of erasing chalk or pencil.

expression, should be studied, as large as in life, from good prints.* Too much care cannot be taken in the choice of the figures or busts which are used as subjects for study; in general, the casts from original antiques, or good copies of them upon a reduced scale, are far more useful in forming the taste, than the fanciful or affected creations of modern talent. There is nothing to fear, in point of style, from the cold severity of the ancients; a thorough knowledge of the abstract principles of beauty can only be derived from them; individuality of character is an after-consideration, and must be acquired by studying the expression of the passions in the looks and attitudes of those about us.

In copying prints, as a study of light and shadow, it will be well to select such as have been taken from sculpture; as in these alone the engraver confines himself to their imitation. In prints which are taken from paintings, there is always a degree of strength given to the engraving, in exact proportion to the local tints in the picture; this is termed colour, and when skilfully executed, contributes greatly to give an idea of the effect of the picture imitated. It would by no means be a waste of time to copy, in Indian ink, or sepia, a good print or two in each style—which you will have no difficulty in distinguishing, by attending to the above observations—one from marble; say, an antique statue or bas-relief; and one from a fine painting.†

Although it would be wrong in us to encourage the smallest expectation of producing a good original picture, unless the student be acquainted with geometry, perspective, anatomy, &c.,‡ we by

* We would suggest to the student, as far more desirable, and, in fact, as absolutely necessary, should she desire artistic excellence, the copying of plaster casts, both from the antique and nature, also anatomical casts of the different limbs.

† We strongly recommend the student to make a careful and thoughtful copy, in pen and ink or sepia, of a good photograph, which will teach many a valuable lesson of detail and delicacy combined with breadth of effect. Nothing is more useful in training the eye to distinguish the minute beauties of natural detail than the study of photographs, whether of humanity, architecture, landscape, foliage or still-life. After making careful studies in light and shade and form from nature, the student should compare her drawings with photographs of similar subjects. This comparison will reveal many shortcomings in the work of the young artist, each revelation of imperfection and shortcoming being a valuable lesson.

‡ Without a certain amount of knowledge of the proportions and drawings of the various parts of the skeleton (especially of the knee and elbow joints of the hands and feet and chest, and in fact of all those portions of the skeleton which, though somewhat disguised by the skin and muscles, protrude their hard forms on the sight), together with a knowledge of the superficial layer of muscles, but a very imperfect power of drawing the human figure can be attained. The same applies to the drawing of animals.

The difficulties of obtaining this slight knowledge of anatomy requisite for the ordinary purposes of amateur artists are, however, not very great at the present day. The little 'Hand-book of Anatomy,' written by Mr. Warren, the artist, or Mr. South's 'Description of the Bones,' with numerous plates, price half a crown, will be found very useful. Many excellent prints too, both of the skeleton and muscle-clothed human figure, intended for the use of artists, can be procured at small cost.

In most of the Government schools of design throughout England, and in several

no means intend to restrain her from practising, until a perfect knowledge of these sciences is acquired; practice and theory should go hand-in-hand; the sketch-book cannot be too much in use; a happy thought should never be suffered to escape, even before the manual skill requisite to transfer it has been acquired; indeed, sketches of ideas, recollections, and hasty observations, will always form a class in the portfolio, separate from the more careful studies of form, colour, light, and shadow.

It is an excellent practice, after studying any subject, to put the drawing aside, and endeavour to make another from recollection; this is the first step towards composition, and a comparison of the two studies will show how much of the original you have made your own, by impressing it on the memory.

The principles of light and shadow, as applied to landscapes, should be studied in sepia or Indian ink, as the combination of their effects with colour only tends to perplex the student in a preliminary course of study.

In drawing from nature, the principal object, must be carefully distinguished; and it is the more necessary to mention this, as it is a point frequently neglected by masters, who endeavour to make all parts of the picture equally interesting; the result is, that the subordinate divisions overwhelm and destroy the effect of the principal. Simplicity is one of the leading characteristics of beauty. Whatever the principal object may be—for instance, a building, a tree, a mountain, an animal, or a river—place it so as to receive the strongest light and shadow. If the subject have been selected for the sake of the beauty of its distance, the foreground should not detract from the attention due to it, by the introduction of figures; for it must be particularly noticed, that the actions of human nature are so much more interesting than inanimate objects in general, that even a peasant reposing will sometimes balance, in point of attraction, an object many times larger, and which is intended by the artist to be much more important, on the other side of the picture. Everything introduced, which is not

drawing academies in London, ladies have the great advantage of drawing from the real skeleton, and also from plaster casts of the muscles. Anatomical casts of limbs and of the entire human figure can be purchased without much outlay at any good cast-shop, and are of permanent utility for reference. The student, however, should carefully seek out in her anatomical hand-book the name, origin, and insertion, and the action, of each muscle as she draws it from the cast, and thus fix its name, position, purpose, and form in her mind. The most useful anatomical casts for an amateur are a muscle-figure of a man, between two and three feet in height, standing straight upright, with one outstretched arm, and the muscle-figures of animals.

Whilst on the subject of casts, it may be as well to recommend the casts in plaster taken from natural leaves and foliage. Not only are they very beautiful objects in themselves, retaining the minute veinings of nature, but are inestimable to students for the study of light and shade and form, and as the first steps to drawing from living foliage, in which the difficulty is enhanced by local colour and the gradual fading of the leaves.

subservient to some definite and well-understood purpose, is prejudicial to the general effect of the whole. The spectator should never be suffered to doubt for a moment the intention of the artist in the choice of his subject.

We often hear young practitioners complain of the difficulty of drawing trees; these should be made the subject of separate studies, and the character of each species ought to be carefully distinguished. There is quite as much difference between two sorts of trees as of animals; a tree, in the foreground of a picture, should never be so drawn as to leave the spectator in the dark as to whether it is intended to represent oak, ash, beech, plane, hornbeam, or elm. Excellent prints, as examples,* are to be had, and they should be taken out into the fields by the student, and compared with nature. The next lesson is to draw the tree from nature, without the assistance of the print, and to compare the drawing and print together afterwards. To those who spend much of their time in the country (and who else may hope to succeed in landscape?) we will point out an opportunity which they possess of acquainting themselves with the characters of trees. There are many fine days, early in the year, when the weather is mild enough to admit of sketching from nature, before the groves are clad with their summer verdure;† and if accurate drawings be made at this season, and kept till summer, they will greatly assist in studies from the same trees; indeed, it will be found a most pleasing as well as an instructive practice, to compare the sketches so made in spring with the trees themselves in summer; and to account for the large masses of foliage, by tracing, with the assistance of the previous sketch, the branches, now hidden from the sight, from which they spring and still derive support.

Many good sketches are lost, or produce unsatisfactory pictures, by effects being chosen unsuitable to the character of the scenery. It may happen, that a castle, or massive building, has been drawn in the morning, and it may have a dull, heavy effect; when the same structure, indistinctly seen in the repose of evening, or the solemnity of twilight, would convey to the mind an impression of grandeur and gloomy majesty. It is right to sketch at all times and in all seasons; but it is the province of an artist, when he

* Kennion's 'Examples of Trees in Landscape,' 4to, 60 engravings, London, 1851, 18*s*.—J. D. Harding's 'Drawing Lessons on Trees,' 4to, Lond., 1850, £1 5*s*.—Strutt's 'Silva Britannica et Scotica, or Portraits of Forest Trees,' folio, Lond., 1826, 50 engravings, £4 10*s*.

† Nothing has conduced more than photography to open the eyes of artists to the beauty of leafless trees; and we trust that amongst our readers there are many who will study trees in winter, in spring, and in autumn, under the varied effects produced by the entirely bare network of branches, or by their partial bareness diversified by the manifold tints of unfolding or fading leaves, not alone as a useful lesson in tree-anatomy, but also for the sake of the intrinsic beauty of these diverse changes.

selects from the sketch-book a subject for painting, to determine under what aspect it would appear to the greatest advantage, and not to be influenced by the accidental circumstance of having seen it in one effect only. Painting a scene from nature is something more than copying. A morning effect is suitable to a composition of pleasing forms; busy scenes are consistent with the bright, open light of mid-day; and repose is in harmony with the softness of evening. In the representation of a low, flat country, with a single object standing unsupported as the subject of the picture, a great interest is required in the sky; while a scene full of detail or attraction in itself, should not exhibit any atmospheric phenomena calculated to withdraw the attention from the principal objects.

We shall now proceed to give a few general hints upon the *theory and use of colours*. There are but three primitive colours —red, yellow, and blue; from these all the others are derived. The combination of red and yellow produces orange; of red and blue, purple; and of blue and yellow, green. The iris, or rainbow, is divided, by Sir Isaac Newton, into 360 parts, of which violet occupies 80; indigo, 40; blue, 60; green, 60; yellow, 48; orange, 27; and red, 45. These observations relate to scientific arrangement; practical utility, which is our principal object, requires that we should treat of them as pigments, or the substances by which the local tints of objects may be pictorially expressed.

The discoveries of modern chemistry * have added largely to the comparatively simple list of colours employed by the old masters, and yet, if these discoveries were ten times more numerous, they would never, of themselves, enable us to rival the beauty of colouring to be found in their best works. It is not so much the brilliancy of the colours used, as the skill with which they are employed, that renders the old masters world-famous.

The colours (or pigments, as they are technically termed before they are ground and prepared for painting) are derived from several sources; the animal, vegetable, and mineral kingdoms, as well as chemical science, each contributing its share.

We subjoin a list of those colours most generally used in oil painting, and which we would recommend to the student, together with their properties of quick and slow drying, regarding which we shall still have something further to say.

* As a useful and practical little book, we would recommend a small 'Guide to Oil Painting,' published by George Rowney, Rathbone Place, at a shilling. We have to thank its author for several useful remarks extracted into our pages.

WHITE.

*Flake White** (chemical) is the only permanent white. Dries well, opaque.

YELLOW.

Yellow Ochre (earth), dries well, opaque.

Naples Yellow (chemical). There are several tints prepared of this colour. A good drier, opaque. It should be used with an ivory palette-knife, as the contact with steel is detrimental.

Raw Sienna (earth), much used, though an indifferent drier; transparent.

Yellow Chrome (chemical), of doubtful permanency, dries well, opaque.

Yellow Lake (vegetable), dries very slowly, very transparent.

Italian Ochre (earth,) dries well, transparent.

Cadmium Yellow (mineral), dries well, opaque.

Lemon Yellow (chemical), dries well, semi-transparent.

RED.

Vermilion (chemical), dries rather slowly, opaque.

Light Red (earth), dries readily, opaque.

Indian Red (earth), dries well, opaque.

Pink Madder (vegetable), a bad drier, transparent.

Carmine†
Scarlet Lake
Crimson Lake
} All insect. Very bad driers, and all transparent.

BLUE.

Ultramarine (mineral), dries well, transparent. Very expensive.

French Ultramarine (chemical), dries well, transparent. Is often used instead of the pure ultramarine, for economy; but is by no means to be compared with it for beauty of colour.

Ultramarine Ash, rather bad drier, semi-transparent.

Cobalt Blue (metallic), dries well, transparent.

Prussian Blue (chemical), dries well, transparent.

GREEN.

Terra Vert (earth), a good drier, semi-opaque.

Verdegris (chemical), not at all a permanent colour, except when applied alone in copal varnish and a little oil, in which it is now and then used as a glazing colour. Should never be brought into contact with cadmium or lemon yellow, as it acts chemically upon them. A good drier.

Emerald Green (chemical), dries well, opaque.

* We would especially recommend the permanent flake white, sold by C. Roberson and Co., 97, Long Acre, London.

† Madders and lakes, yellow lake included, have a tendency to coagulate; the student is cautioned against keeping tubes of these colours long in her colour-box. When once coagulated they are worthless.

ORANGE.

Orange Vermilion (chemical), dries well, opaque.
Orange Chrome (chemical), dries well, opaque.

PURPLE.

Purple Lake (insect), the character of all lakes.
Purple Madder (vegetable), same as all madders.

BROWN.

Raw Umber (earth), dries well, semi-transparent.
Burnt Umber (earth calcined), dries well, semi-transparent.
Vandyke Brown (earth), dries very badly.
Cologne Earth (earth), slow drier, transparent.
Brown Pink (vegetable), dries badly, transparent.
Madder Brown (vegetable), dries badly, transparent.

BLACK.

Ivory Black (animal charcoal), slow drier, transparent.

Colours, when prepared for oil painting, have been ground in oil, and the three kinds of oil used for this purpose are linseed oil, nut oil, and poppy oil. These have the property of solidifying when exposed on a surface to the air. This property is called drying, and they are here set down in the order in which they possess this quality. *Linseed oil*, when spread by itself upon a piece of glass, should dry in warm weather within a day. *Nut oil* requires a few hours longer, *poppy oil* ought not exceed a couple of days. These oils, however, when mixed with colour, are more or less influenced in their power of drying, some colours greatly accelerating it, whilst others retard it. The state of the weather also has a powerful influence over the drying qualities of these oils, either cold or wet retarding materially the drying of a picture. One of the minor difficulties encountered by inexperienced students of oil painting, but one, nevertheless, causing considerable embarrassment, is the delay often experienced by them in the drying of their studies in oil. Unless the surface of a former day's work is dry, that is to say, is not liable to *move* under the application of fresh colour, it is a hopeless attempt to proceed. As a rule, we would advise the student to allow at least a couple of days to elapse between each painting over the same surface, and even then carefully to ascertain, before commencing, that the surface is dry. This delay will not prevent work proceeding upon the same picture from day to day, should the picture be of any considerable size; for a picture consists of many portions, and these can be worked upon in rotation. To avoid the temptation

of working upon a surface in an oil painting until it be sufficiently dry, it is a good plan for a student to have several studies proceeding at once, and which can therefore be worked upon by turns.

Our space will not allow us to enter at any length upon the subjects of what are technically called "magnilps" or "mediums," by which are meant various compounds of the oils already mentioned, and of mastic or copal varnishes, for the purpose of diluting the colours when being laid upon the canvass, mill-board, or panel.

In any of the guides to oil painting, are to be found recipes for the preparations of different mediums; but our advice is, that the student, instead of troubling herself about their preparation, should purchase 'Roberson's Medium,' which is to be procured at all colour-shops throughout England. This however, being rather expensive, should be carefully used, and only in delicate quantities.

There is an object in the use of "mediums" besides the simple diluting of the colour, and this is the introduction of the varnish contained in the "medium" to hasten the drying of the colours, varnish drying very rapidly. 'Roberson's Medium' being contained in a tin tube, as are all oil colours now in modern use, requires to be squeezed out upon the palette.

Affixed to the palette the student must have a small tin vessel, to be bought at all colour-shops, and called "a dipper." This dipper is most useful when divided into two compartments. Into one of these the student should pour a small quantity of spirit of turpentine, into the other a little copal or mastic varnish. Diluting the colour simply with a little turpentine is sufficient for delicate and fine painting, and is an extremely agreeable "medium" alone for such work, drying very rapidly however. The varnish is to mix in very small quantities with such colours as are peculiarly difficult driers, such as lakes, madders, &c. (*Vide* List of Colours.)

A very pleasant medium, and one highly spoken of, called 'Siccatrif,' has just been manufactured by Messrs. Rowney. It is intended to supersede the use of oils and magnilps, or any other medium. It is extremely agreeable to use for delicate painting, being liquid. It must be poured out into one compartment of the "dipper," a little turpentine into the other. 'Siccatrif' can be used either alone, or with an admixture of oil or turpentine. The former makes it dry more slowly; the latter more quickly.

After a picture has lain by some time, upon taking it out and attempting to work afresh upon it, the artist frequently finds the surface will not receive the fresh colour; a small quantity of rum

or any pure spirit rubbed over the picture with a clean linen rag, and then dried, will quickly cause the colour to take.

The most usual and convenient mode of procuring oil colours is to purchase them ready ground in oil, in tin tubes, which fit into the compact, flat, japanned-tin boxes, filled with all needful appurtenances.

The most expensive colours, such as ultramarine, carmine, and the lakes and madders, which soon coagulate when mixed with oil, many artists prefer to purchase in powder. These colour powders may be used either with oil or water. An oil-colour box, if intended to be carried about from place to place, should be as flat and light as possible, consistent with its containing a good supply of sable and hog's-hair brushes; at least a couple of vials for varnish (or siccatrif) and turpentine; a couple of palette-knives—one of steel, the other of bone—and a supply of clean linen rag. A wooden palette is usually fitted in the top of the box.

For painting out of doors, a small *papier maché* palette, fitting into a japanned case, should be procured. The advantage of this palette is, that the colours may be placed upon it at home ready for work, before the artist sets forth to his painting, being sufficiently protected within the tin.

Water-colour painting and drawing may be pursued in a room in which other persons are engaged; but oil painting requires a room which can be entirely devoted to this purpose, and the more simply furnished the better. The great requisite is a good light, which, if possible, should come from the north or north-east, that being the steadiest; but it is desirable also, to have a window through which the sun shines, in order to study, when needed, effects of sun-light on drapery, flowers, &c. When sunshine would interfere with painting, the shutters can be closed. A matting is better than carpet, on account of its harbouring less flue. A few chairs and a table are all the furniture the student will require beyond her easel, a few good drawing-boards, a port-folio, colour-box, rest-stick (on which to rest her hand whilst painting), a looking-glass hung where she can see her picture reversed—a most excellent mode of criticising it—and a sufficient supply of artistic material in the way of paper, pencils, &c. A few well-chosen prints and casts placed upon the walls (which should be self-coloured, of some tint agreeable to the eye, and not covered with any gaudy large-patterned paper), and a small book-case filled with books relating to art, would make this little room not only comfortable, but really elegant. In how many houses is there not some attic or spare room which might be thus converted into a delightful place of study, at but very small expense. In fact, unless some separate place of study

can be found for the student of oil painting, we would recommend her not to attempt it, but to pursue her love of art through the study of water colour, and drawing with pen, pencil, and chalk, means wide enough, and leading to an equal expression of beauty. For after all, the student must ever bear in mind that it is the command she acquires over the material, and not the material itself, which produces agreeable results.

Before quitting the subject of Oil painting, there are two things of which we would suggest the importance: one is preserving the picture whilst wet from dust and flue; the other, the careful cleansing of the palette and brushes, after they have been used, with turpentine, which is generally done in a little vessel called a brush-washer. After frequent washing in turpentine the brushes have a tendency to become rather hard; to obviate this, they should be occasionally washed with a little soap in *warm*, but on no account boiling, water, and then be wiped very nicely with a cloth, care being taken not to rub up the hair, but keep it nicely even.

Moist water colours are now almost exclusively used by artists in preference to cakes of dry colour, on account of the greater facility in their use. These moist water colours can be purchased in tubes similar to those containing oil colours (in which case they have to be squeezed out upon the palette), or in small square porcelain saucers, which fit into the flat japanned colour-boxes. A box, containing the following moist colours, will be found sufficient for all ordinary purposes:

Cobalt.	Yellow Ochre.	Mar's Orange.
French Blue.	Indian Yellow.	Extract of Vermilion
Prussian Blue.	Emerald Green.	Lake.
Indigo.	Hooker's Green.	Carmine.
Black.	Raw Sienna.	Violet Carmine.
Gamboge.	Burnt Sienna.	Brown Madder.
Cadmium Yellow.	Indian Red.	Vandyke Brown.
Lemon Yellow.	Light Red.	Sepia.

Sable brushes are the best for water colours. Two of the large and several of the smaller sizes will be sufficient.

Field's 'Chromatography' will be found a useful work of reference, with regard to the use of the various pigments, and their actions upon each other.

In order to develope within the eye and mind a refined and subtle sense of the harmonies and magic power of colour, the student should make herself familiar with Chevreuil on 'Colour,'

of which the most complete and best of the three English editions, is published by Mr. Bohn, at 5*s*.*

It would be a futile attempt to give any directions for the practice of either oil or water-colour painting within our limited space, even were not such attempts at the best but of small service. A few lessons from a good master being worth, to the elementary learner, almost all the printed directions ever penned. What we principally aim at in these pages, is to give the reader simply a few miscellaneous hints.

Although ladies studying art professionally complain with great justice, of the difficulties they have to encounter in their study of the human figure, through want of suitable schools, yet for students whose aim is not professional, or, if so, merely directed towards landscape, simple portraiture, or ornamental designs, excellent instruction, at a very cheap rate, is provided in the Government Schools of Design, now established in most of our chief towns. In London, the head Government School of Design, for female as well as male students, is at South Kensington, and this is unquestionably an establishment offering great advantages. There is a female school at 37, Gower Street, Bedford Square, where Geometry and Perspective, Ornamental Design, and Flower Painting, are well taught. Figure drawing and painting are also taught there as well as the poor accommodation which Government allows in the way of room, models, light, &c., admits; and the costume models there are good. First-rate lectures on anatomy are delivered in the spring, in which the student may be examined, and there are good lectures on all subjects connected with art. Terms are one and two guineas for the term of five months.

The instruction in the provincial branch-schools is similar.

London offers various means of instruction to the student, besides private lessons, which can be obtained from various well-known artists. There are two drawing academies, much frequented by ladies, where they can have the use of a fine collection of casts from the antique, as well as of costume models. These schools are Mr. F. J. Cary's Drawing Academy, 21, Bloomsbury Street, Bedford Square, and Mr. Leigh's Fine Art Gallery, Newman Street. Ladies can also draw from the antique in the British Museum.

Female students of art possess, in London, the advantage of being able to study and copy pictures at the National and Vernon Galleries. These are open on Thursdays and Fridays to students,

* We would also recommend for the student's perusal, Sir Joshua Reynolds' 'Lectures,' of which there is an edition by Burnet; the Lectures of Barry, Fuseli, and Opale, published by Bohn, at 5*s*,; and Burnet on 'Light and Shade,' and 'Colour.'

from ten till six; and admission may be obtained by application (accompanied by a specimen of the student's work) to Mr. Wornum, in Trafalgar Square. A student in oil painting can only work at these two galleries for three months consecutively. The British Institution also receives a few pictures from the Annual Exhibition of Old Masters, sent by noblemen and gentlemen for the use of students; admission may be gained by application to the Secretary, upon the same condition. The British Institution is open generally from October, for two or three months daily, from ten till four.

Students frequently copy pictures with a wrong aim. Endeavouring to make the mere facsimile of a picture should not be the one aim of the student, but rather by studying perseveringly the excellences of the picture, she should seek, as far as possible, to appreciate the thought and intention of the artist; and as regards the practice of hand and eye, spare no pains in working out the difficult details, which are the result of much hard study and labour on the part of the painter of the original picture.

Much may be learnt regarding effects of composition, light and shade, and colour, when studying in a picture-gallery, by making small sketches of the most remarkable pictures: but to be of use, these little memoranda should be very carefully made, and everything like slovenliness in them avoided.

We have spoken of some of the opportunities of study afforded to the student by a residence in London, or in one of our large towns. To those who dwell in the country, the greatest and most inexhaustible of all art-schools is before them—the school of Nature. Here lies a wonderful book, constantly open, of which, to the earnestly seeking student, a fresh page daily unfolds itself. A deep sympathy with nature, and a keen and loving comprehension of her spirit, have always characterised a true artist; and they have wrought most nobly who have most unceasingly sought to comprehend and unravel her mysterious beauty.

Amongst the healthiest signs of the present age, is the growing love of the country, discoverable in all classes of society, and in the increasing appreciation of landscape painting. In the most remarkable painters of our present English school, this love of landscape, and of the fragile beauties of flower, foliage, and sky, has singularly exhibited itself.

Many a student learning to paint in some great town, sighs restlessly, as he sits before his easel, for a breath of pure, fresh air, and for a glimpse of lovely sunlight playing merrily over rich foliage, or breezy meadow or corn-field. A glance up through the high studio window towards a patch of sky—blue, spite of the smoke from a thousand chimneys—will send a pang, as of very

home-sickness, through his soul, as the budding, tender freshness of young leaves in thick woodlands, or glorious showers of sunny white pear-blossom or blushing apple-bloom, still more ineffably beautiful when seen against the vernal blue of heaven, flash in vivid loveliness before his soul; when, perhaps, to ease the restlessness within him, he vows to set forth on the first fine holiday into the nearest rural haunt, and there drink deep draughts of happiness and knowledge.

The dweller in the country is daily surrounded by exquisite beauty, ever changing in a quick and endless succession. And this beauty is constantly calling to him, in tender voices, to perpetuate her by human means, as simple hymns to the glory of her Maker, and as words of solace to dwellers in towns and gloomy places.

Many a dweller in the country, however, will perhaps say, "But what can I find to draw where I live? There is no fine scenery about us. I can see nothing to make a picture of."

Everywhere in the country, we would reply, however uninteresting the chief features may sometimes happen to be, there are to be found, without difficulty, various kinds of grasses, ferns, fungi, lichens, wild flowers, garden flowers, trees with their varied characters belonging to the changing seasons, tree-roots, mossy stumps, perhaps sea plants, or moss-covered stones, and birds' nests, with their marvels of mossy architecture, and their still greater marvels of beauty in variously tinted eggs. Once having seen a bird's nest, a tuft of primroses, or branch of hawthorn, painted by the veteran William Hunt, the water-colour painter, who will dare to say that subjects fit to become exquisite pictures, cannot be found everywhere in the country?

We would advise our young artist, before she sets forth on an out-door sketching campaign, to be provided with a water-proof cloak, a broad-brimmed hat to shade her eyes, and a thick-soled pair of boots to keep her feet dry. The requirements of a water-colour painter out of doors are but few. A box of moist colours and a bottle of water, the japanned case of which, dividing into two cups, can be attached by little hooks, to the opened lid of the paint-box, which serves as a palette; together with the sketching block, or, if the drawing be large, paper strained upon a light board, are about all the apparatus needed, unless we add a square of macintosh, which will be found useful, in case of damp, to lay upon the grass. Yes, there is still another thing required before the sketcher's comfort is insured, which is a sketching umbrella to protect her from the sunshine, which is very trying to the eyes whilst at work. This may be purchased at any artists' shop. It is a good plan, in painting out of doors upon a large

board, to have a broad tape passed under the upper end of it, and over the shoulders, the lower end resting upon the knees. Upon this tape the drawing is supported as upon a desk.

To paint in oils out of doors is a far more embarrassing affair, on account of the number of requirements, than to paint in water colours.

The umbrella is of course equally required. If the sketch or picture be larger than can be supported upon the lid of the paint-box, the box being placed in the lap, and raised into a kind of desk by means of the little wire support found in all oil-colour boxes, there is nothing for it, but taking an easel out with you. Portable easels, however, though an additional burden, are very light, and cleverly fold up together.

If PORTRAIT PAINTING be the ultimate object of the student, the best preparatory course, after a knowledge of drawing in chalks is acquired, will be to practise from busts, with a single colour, and white. The management of the gradations of light and shade, and the use of the brush, will be quite sufficient to occupy the attention of the student for some time, without distracting it by a variety of tints.

The principal colours used in portrait-painting are flake white, ivory-black, ultra-marine, cobalt blue, yellow ochre, light red, vermilion, lake, Indian ink, burnt umber, burnt terra-sienna, Vandyke brown, Naples yellow, and Prussian blue. Such of these as are required, according to the complexion to be imitated, are laid round the palette, and tints are composed by mixing them with each other, and with white. Light red and white is the best general tint for the ground of the flesh, which may be altered to the complexion by an addition of vermilion, or brown ochre, as the case may require. It is almost impossible to give any positive rules for mixing the tints; various methods are adopted by different artists, and experience is the only guide.

The lights should be painted with a strong body of colour, and the shadows kept thin and transparent.

The shadows of objects are, strictly speaking, of no colour; that is to say, shadow being but the absence, or interception, of the direct rays of light, colour is never increased by it. In water-colours, the general breadth of shadow is best imitated by a neutral tint of a cool retiring colour. Artists mix these tints in various manners: indigo and Indian red are frequently used for this purpose; but whatever mixture be adopted, it is an invariable object to produce a clean, pearly hue, which will unite agreeably with either the warm or cold colours.

Objects seen *against* a strong light assume a neutral tint, while those *upon which* a strong light falls display the beauty of their local colours: the former, also (as well as those under the in-

fluence of shadows falling upon them), should not be made out too distinctly; the latter, on the contrary, require the utmost care in finishing.

Miniatures * should always be very highly finished. The ivory is sold, ready prepared for painting upon, by most artists' colourmen. For large pictures it should be purchased ready laid down upon caoutchouc or gutta percha. Thus prepared, it may be bought at Straight's, 35, Charles Street, Hatton Garden.

If small, before the ivory is used a piece of very thin white paper should be gummed over the back of the ivory. This paper must be thoroughly dried before the picture is commenced. After the miniature is finished, it requires pressing before it is framed; but this being a process requiring much care, young miniature painters are advised to leave this to be done at the frame-makers where it will be framed.

If only the bust be represented, it will generally be advisable to make it one third of the length of the ivory, and to place the bottom of the face in the centre; this, however, must be varied if the sitter be above or below the middle size, as an idea may be conveyed of the stature of the person by placing the chin above or below the centre of the picture. Some of the miniature-painters make their outline on paper, and fix it under the ivory, the transparency of which enables them to trace it with a faint colour on the surface. This seems to be a good practice for those who cannot draw a likeness without many alterations and corrections, by which the surface of the ivory might be injured.

The colours should be used with soft water. Ultramarine and the madder-lakes† form a delicate pearly tint for the flesh, with which the shadows may be generally defined; the reflections must be of a warmer hue; for these, raw terra-sienna or dark ochre may be used. Indian red is a very useful colour, but of a heavy body, and in miniature-painting requires to be used with great delicacy. The colours prepared from madder, both reds and browns, are permanent, and quite brilliant enough for the local tints of flesh, except in some instances, when a few touches of brighter colour are required; as on the lips, for instance, or upon a complexion of a peculiar bloom. Carmine must not be used, as that colour soon vanishes when laid upon animal ivory. The colours should be laid on gradually, either by light touches, which

* See Whittock's 'Minature Painter's Manual,' 12mo, Lond., Bohn, 1814, with seven coloured plates, 3*s*.

† One of our first miniature painters says: "When you begin to make your outline on the ivory, it should be delicately done with pink madder. I use cobalt and yellow ochre, cobalt and Venetian red, cobalt and brown madder, or cobalt, pink madder, and Indian yellow for the shadows, occasionally touching the darkest with burnt sienna—carmine fades directly on ivory."

method is termed hatching, or by dots, called stippling. The greatest care is necessary to avoid leaving a body of colour on the ivory; in fact, it is well to dilute the colour until it becomes thin, and to use it from the top, so as only to take up the finest and least substantial part. It is an expeditious method of beginning a picture to lay in broad washes of colour; observing to allow for finishing by leaving them lighter than the final effect intended to be produced, as the full tone of colour must be very gradually approached.

In painting white drapery, pearls, &c., as ivory is not perfectly colourless, it is necessary to mark the highest lights by a little permanent white. By previous studies, for which the ball, cylinder, &c., have been recommended, the student will have discovered how small a portion of the surface of any rounded object admits of the full brilliancy of absolute light: in painting upon ivory the most projecting point in such a light may approach to shining; and if a colour have been washed over the whole, it may require to be removed from the points: this may be done by means of a sharp scraper, or penknife.

One of the little inconveniences which learners have to contend with, in painting upon ivory, arises from the colour merely lying on the surface with so little adhesion; this requires some care: a touch must never be repeated until the colour previously laid on is perfectly dry, or it will bring off the latter, and leave a spot of clean ivory.

Draperies of a dark hue are often painted, for the sake of expedition, with a body-colour, made by mixing white with it; in addition to which blues and blacks require Indian red to counteract their coldness. This body-colour will dry lighter than might be supposed from appearances when it is first laid on, and the shadows may be glazed over it with Indian ink, or ivory black and lake, diluted with water only, without any mixture of white or gum. The darkest shadows may be produced by gum water, but this depth must be reserved for the last sharp touches. It is necessary to observe, that some artists paint the draperies transparent, as well as the faces. A powerful magnifying-glass should be used, in order to discover and remove any particles of the colours; as miniature paintings, in addition to all the requisites which they ought to possess in common with larger pictures, are expected to bear the closest examination.

There are two very beautiful branches of Art which have within the last few years begun to be occasionally cultivated by ladies, and which, from their intrinsic beauty and delicacy of manipulation, are peculiarly adapted for the development of feminine artistic power. One is *Etching*, the other *Illumination upon vellum*.

Any one accustomed to draw with pen and ink will, after a few lessons from an engraver, be able to etch with ease, and will find the process extremely agreeable. But to have the designs properly "bitten in," that is, eaten into the metal plate by the application of acids, and afterwards worked off, a lady will always find it best to be in communication with a professional engraver.

The whole process of illumination can, on the contrary, be carried on throughout by the lady herself.

Our limits do not permit us more than slightly to refer to this interesting class of artistic work, but we would gladly turn the attention of our young lady readers in that direction.

Various very beautiful and careful transcripts from celebrated old illuminations contained in valuable mediæval missals have been published within the last few years by Shaw, Owen Jones, Noel Humphreys, and others, and to these we would refer our readers interested in the subject, as the best examples of the various styles of illumination. In the British Museum is a valuable collection of original missals and illuminated manuscripts, well worthy of the most respectful study.

As a means also of fixing permanently in the student's mind the various styles of ornamentation employed by the old illuminators, and also as reference, we advise the student to make tracings of all such illuminated letters or designs as may chance to come in her way. For this purpose Shaw's 'Handbook of Mediæval Alphabets,' and other works are most suitable. Tracing-paper will receive colour very well, if it be carefully laid on, and not too wet.

Admission may be obtained to copy at the British Museum from the illuminated MSS. But of course no tracing can be taken; all must there be copied by eye—an excellent practice.

A student desirous of making an essay in illuminating, will find Humphreys' 'Art of Illumination and Missal Painting,' a useful hand-book.

PERSPECTIVE.

The science of Perspective is the most powerful auxiliary to the art of Painting. It is founded on immutable principles, and never can be subject to the caprices of fashion, or admit of the modification of individual taste; it may be defined—"The art of representing, on a plane surface, the forms of objects as they appear to the sight." Our fair readers of more developed intellect will pardon our answering a question which may be supposed to proceed from their younger sisters—"Do our eyes then deceive us?—and do not objects appear to the sight as they really are?"

We reply—"Your eyes do not deceive you, but the mind supplies the deficiency of information derivable from them." Look down any long street, and observe how the houses and people seem to diminish as they recede from the eye. You are not deceived by this appearance, for you have been at the other end of the street, and know that the houses and people are as high as those at this end; but this is the knowledge of the mind, not the information of the eye, and a person who had been always blind, and suddenly received sight, would not form any idea of the apparent diminution of objects on account of their distance, but would fancy them equally close to the eye, and less in size: this has been experienced.

To find rules by which the exact degree of this apparent diminution may be determined, is the object of our study. Practice must accompany theory at every step: a drawing-board, a set of mathematical instruments, and a knowledge of geometry,—at least as much as will enable us to construct the most usual figures, are indispensable.

In commencing the practice of Perspective, the boundary of the picture must be considered as an aperture, through which the object to be represented is to be viewed; and the surface of the picture itself as a transparent plane, or sheet of glass, upon which the outlines of the objects seen through it are to be delineated.* The extreme distance where the earth, if perfectly level, would appear to meet the sky, gives the horizontal line, which must be as high in the picture as the eye of the spectator. Agreeably to this rule, in drawing from nature, if the view be taken from an elevated situation, the horizontal line must be high in the picture; and if the object be considerably raised above the eye of the spectator (as a mountain or castle), the horizontal line should be proportionately low; taking one third of the height of the picture as the average place of the horizontal line when the scene is level.

Now observe, the earth, if level (perhaps the sea, being subject to no inequalities, is a better example), appears to arise as it recedes, till it becomes no longer visible; and the sky, descends, till they unite, or mutually vanish in the same line; the horizontal line is then the vanishing line of all level planes parallel to the earth and sky, whether these level planes are

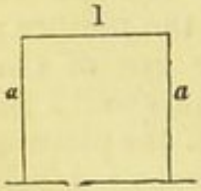
* "Let the eye be placed at some fixed point, opposite the middle of the pane of glass, the lines of the landscape may be traced on the glass as you see them through it. When so traced, they are in true perspective. If the glass be sloped in any direction, the lines are still in true perspective, only it is perspective calculated for a sloping plane, while common perspective always supposes the plane of the picture to be vertical. It is good in early practice to accustom yourself to inclose your subject, before sketching it, with a light frame of wood, held upright before you; it will show you what you may legitimately take into your picture, and what choice there is between a narrow foreground near you and a wide one further off; also what height of tree or building you can properly take in, &c."—Ruskin's 'Elements of Drawing,' Preface, p. 21.

above or below the eye. Were you to stand at one end of a long room, and imagine the opposite end to be removed, and the ceiling and floor to be infinitely protracted, the one would appear to descend, and the other to ascend, until the view of both would be lost precisely in the line of the horizon. Leaving the consideration of the ceiling and floor for awhile, let us observe the side walls of the room; which, being perpendicular planes, parallel to each other, have one common vanishing line; for, if infinitely extended, they would seem to meet in a line; and the point where this perpendicular line crosses the horizontal line, is called the point of sight, being directly opposite to the eye of the spectator. To this important point, all parallel planes, whether perpendicular, horizontal, or oblique, converge, if they go directly from the spectator towards the horizon. The principal visual ray is the line of sight extending from the eye of the spectator to this point.

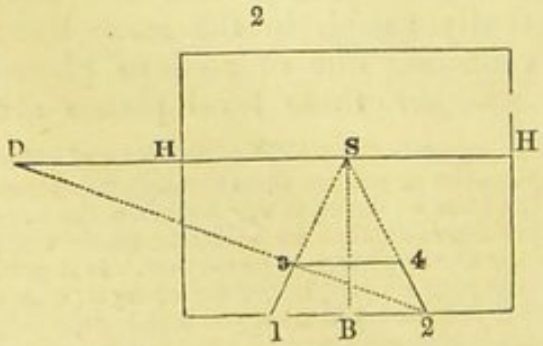
The base line is the bottom of the picture.

The point of distance must now be considered: the meaning of this term is, the distance of the eye from the imaginary transparent plane, or the picture which is to represent it; and this distance must never be less than the length of the picture, because that distance gives the greatest possible angle, within which objects can be distinctly seen at one view.

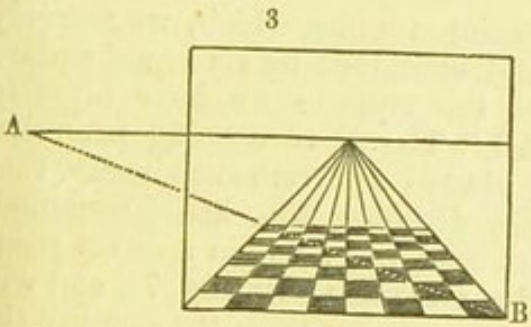
We now proceed to give practical illustrations; earnestly recommending to the student to practise the examples upon a larger scale, in preference to merely going over them in the mind.



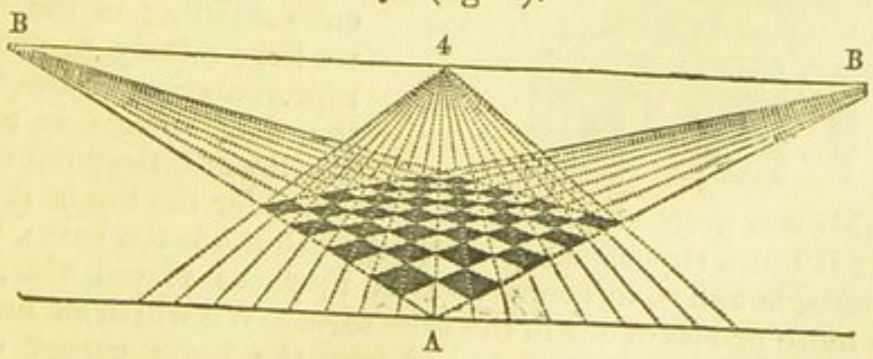
Let it be required to give a representation, in perspective, of a superficial square; one side of which shall be placed against the base line of the picture (fig. 1). The size and proportions of the parallelogram, or boundary line of the picture (fig. 2), being fixed upon, the horizontal line (H, H) and the distance of the picture (D) must be determined: on the centre of the horizontal line mark the point of sight (S), and extend the line either to the right or left, at least far enough to receive the point of distance, which we will assume to be the nearest admissible: viz.—the length of the picture, as before observed. Mark this distance on the line (D,) measuring from the point of sight (S), and let fall a perpendicular from that point to the base line at (B). Take half one side of the square,



and mark it on each side of the point (B); draw lines from these points to the point of sight (s). The angle thus formed is the perspective representation of the two lines, forming the sides of the square (*a*, *a*, fig. 1,) supposing them infinitely extended; for though we know that they are parallel to each other, yet to an eye opposite to the point (s), and at the given distance, they would appear to approach each other, in receding, until they would vanish at that point. Our present business is to ascertain how much of the base of this triangle is a representation of the square. Rule a line from the point of distance D to the opposite angle 2; and from the point of intersection at 3, draw a horizontal line to the opposite side of the triangle (4); the figure thus formed will be the true representation required. To avoid complexity of lines, and lead the student gradually forward, we have given but one square, which may be considered a stone of the pavement, or any square object lying on the ground, in which the surface only is considered. To represent a second square, of the same size, lying immediately beyond the first, we have only to consider the line 3 4 as the base line, and by proceeding as before, a second abridgment of a square will be found. We now proceed to show how a series of these squares, as a pavement, or chess-board, may be produced (fig. 3). Repeat the process, as in fig. 1, upon a large scale; then divide the base line into as many equal parts as are required, for one side, and from these points draw lines to the point of sight; these lines will cross the oblique line A B; and horizontal lines passed through the intersections, will divide the whole into the number of squares required.



Our next lesson is to represent the same figure when placed with one corner towards the eye (fig. 4).



The base line, the horizontal line, the point of sight, and per-

pendicular from it to the base, are to be prepared as before; the point of distance is then to be set off on the horizon on each side of the point of sight. The same number of parts as before must next be measured on each side of A in the base-line, and from each of these divisions lines drawn to the point of sight. From the point A, which forms the nearest angle of the figure, lines are then to be drawn to the points of distance B B; and from the intersections of these lines with those first drawn rule other lines to the points of distance, and the work is performed.

There are various scientific modes of putting a circle into perspective; we shall give the most simple (figs. 5 and 6). It will be obvious, that a circle seen from any other point than one perpendicular to its centre must appear elliptical. Make a square of the exact size to contain the circle, and describe the circle within it. Divide the square into a number of smaller squares, and put this reticulated square into perspective, as in fig. 6, and a correct eye will enable us, by noticing what parts of the cross lines the circle passes through in the square, to describe an ellipsis, in the perspective representation of it, with sufficient accuracy for our purpose.

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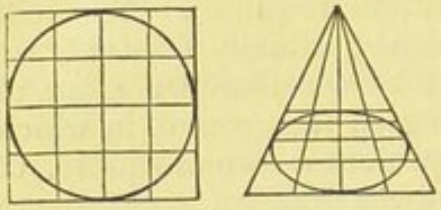
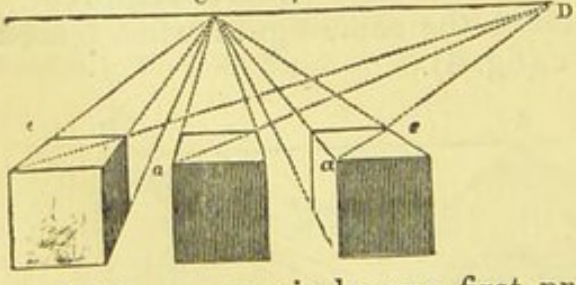


We will now attempt to represent a cube, which, we scarcely need remind our readers, is a solid contained by six equal square sides—in short, a square block; the squares we have hitherto treated of being merely superficial. The picture being prepared as before, by which we must be always understood to mean, that the horizontal line, points of sight, distance, &c., are determined, we will place three cubes on the base line: one in a direct point of view, and one in each of the oblique views (fig. 7), and will suppose them (to simplify the example) of equal size, and below the horizon. In the cube standing in the middle, we have merely to produce a representation of the top, for the sides retreat in a direct line towards the point of sight, and this was precisely our first problem; for the top of the cubic figure is but a superficial square, of which *a b* is the base; but the two outside cubes, in proportion as they are placed wider apart, have more or less of one of the sides seen. We will draw lines then from *a b* of the centre cube; and from the lower corner of each of those placed to the right and left, to the point of sight C, and

C 7 D



oblique lines from *a*, *a*, *a*, to the point of distance D, which will give intersections opposite *e e*, through which horizontal lines being drawn, the representation of the tops of the cubes will be complete, and we have only to let fall perpendiculars from the points of intersection, and the sides of the cubes are obtained.

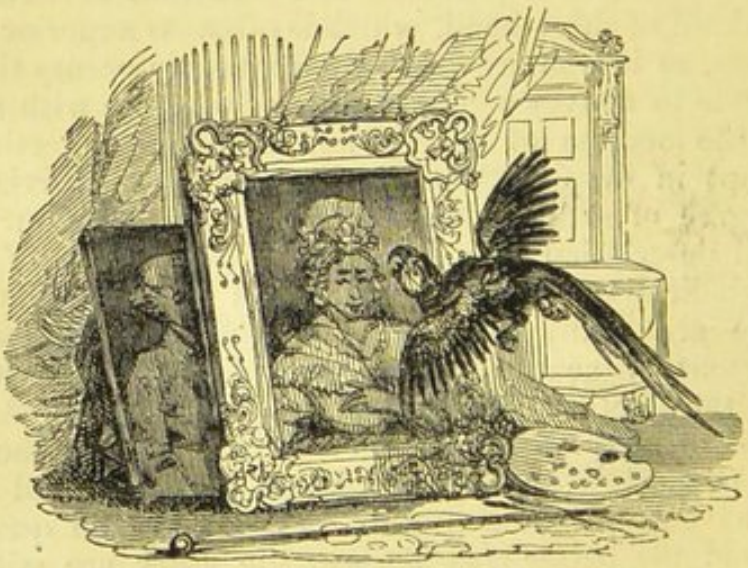
The leading principles of perspective being rendered familiar by practice, it is not necessary, in every case, to go through the whole process; the eye becomes correct, and any violation of its rules is offensive to the sight.

Examples might be multiplied to any extent; but as it would be impossible to compress within our limits a complete treatise on perspective, we have preferred giving such an introduction as may serve to show that the difficulties of the really useful part of this science are not so great as they are generally thought to be; and we are sure, that those of our readers who have accompanied us in this short excursion into the *terra incognita* of the mathematics, will be induced to extend their researches; for this purpose, we recommend them to the guidance of Malton, Dr. Brook Taylor, the 'Jesuit's Perspective,' or Wood's 'Elements of Perspective,' whose learned and comprehensive works have left little for their successors to do but to familiarise the subject, and divest it of apparent difficulties.

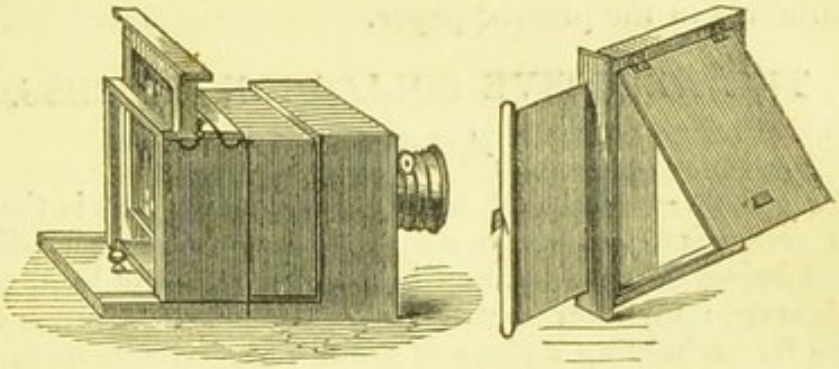
And now let us earnestly recommend the study of the art of drawing to our young readers, not less for the graceful and agreeable employment it will afford them, than for its actual utility, which is, indeed, so manifest on many occasions, that we do not scruple to say, a knowledge of drawing ought to be acquired in youth as a practical art, like that of writing; it is indeed, a kind of short-hand, which is often as superior to writing in clearness, as it is in brevity. It frequently occurs that we find it impossible to convey a correct idea of what we wish to describe, through the medium of words, and after much exertion give up the attempt in despair, when a few moments' exercise of a moderate degree of skill in drawing would elucidate our otherwise ineffectual description at a glance. Two strokes of a pencil, says a periodical essayist, will often tell a tale of unknown length, and there are many tales which cannot be told without it: many persons of acute observation, and profound science have ploughed the depths of ocean, scaled the Alps, the Andes, and, as the same lively writer observes, run all over the world, to disennui themselves, and bring home journals; and when the journals have generated a quarto, or half-a-dozen quartos, nine tenths—and the better part too—of the story are still to seek! There are beasts, and buildings, and men, and plants, and serpents, and gorgons, and chimeras, and countries of all kinds—archi-

tecture that we are desirous to understand — monuments from the time of Nimrod — mountains, whose heads reach the skies: and what is it all when told?—Nothing!—And merely for the want of a few scraps of paper, and a half-pennyworth of Indian ink properly distributed over them. It is not to be expected that the acquirement of this art would ever become of such value to our young readers as to a Humboldt, a Layard, or a Roberts, yet it cannot fail to be of important utility to them, if they think fit to make use of the advantages it affords. A flower, a shell, or almost any natural object, can be much better drawn than described; and a sketch-book filled by one who has attained but a moderate proficiency in the art of design, will afford a more vivid and accurate series of scenes, than the most finished account of them in the leaves of a journal.

We cannot conclude this article without alluding to the recently developed powers of PHOTOGRAPHY. In *landscape painting* its beneficial influence has already become conspicuous, and under the guidance of judicious photographic artists, we now have topographical accuracy united with scenic effect. In *portrait painting* its powers are almost universally familiar. Its great defects in this department are, certain distortions arising from the different effects of light according to the difference of colour and conditions, and its inability to depict the most characteristic and agreeable expression of the human countenance. To choose from the subtle and ever varying traits of expression must still remain the province of the living artist.



PHOTOGRAPHY.



SLIDING CAMERA.

PHOTOGRAPHY (from *φως*, *phos*, and *γραφω*, *grapho*), literally means "writing by light." Every object may be copied by its agency; even the microscope and telescope are made permanently to delineate their wonders, and barometers and thermometers to register their fluctuations. Its uses in portraiture and the stereoscope are too well known to require amplification. More than one process has lately been invented to render photography the agent in producing engraved copper-plates ready for the printing-press; and in this manner prints have been almost instantaneously produced, the reflex of old carvings by Albert Durer and others, entirely without the aid of the graver.

The following is a list of the principal processes:

I. Daguerreotype (now but little used).

II. Collodion, Negative (the process described in the following pages).

„ Positive (chiefly used by the cheap portrait artists).

„ Dry (used by travellers, as the plates can be carried abroad ready prepared.)

III. Waxed Paper (a process used where extreme nicety of detail is not required, and where the weight of glass would be an objection.

IV. Calotype or Talbotype (the original paper process, now but little used).

Of all these the "negative collodion process" yields the best results with the least trouble and expense, and is therefore the most practised. Those who wish to have practical lessons in the art should apply to a professional photographer; and we take leave to recommend Mr. J. B. Hockin, of Duke Street, Manchester Square, the gentleman to whom we are indebted for the information contained in the present paper.

THE NEGATIVE COLLODION PROCESS.

Apparatus.

The Camera.—The most convenient form of this is the sliding camera (*see Vignette*), which consists of a box in two divisions, the front being the largest, and having a projecting lens, as in the magic lantern; the back section being fitted with grooves wherein slide the frame holding a plate of ground glass for focussing, and a dark frame for holding the prepared plate. Both the camera and the lens must be carefully finished, as on this depends much of the operator's success.

Lenses.—These should be achromatic, *i. e.* composed of two varieties of glass, of different refractive powers, in order to produce coincidence of the visual and actinic rays of light.

A single lens is sufficient for landscapes and still-life, but is necessarily used with a set of diaphragms (circular plates of blackened metal pierced with holes of various sizes, from three eighths of an inch upwards) to counteract spherical aberration, which is inherent in it, and produces distortion.

The double lens is used for portraiture; its focal distance being half that of the single, the time of exposure is diminished by concentration of the luminous image within a smaller compass. For objects all lying in one vertical plane, or nearly so, the double lens may be used without the diaphragms, but these are necessary when it is proposed to include various planes, and thus produce a perspective effect. They are also useful in diminishing the amount of light, and so lengthening the time of exposure, which is a convenience to the artist, as the prepared plate is so sensitive that the hands are frequently not quick enough to uncover and again cover the lens before the photograph is spoiled from over-exposure.

The Tripod Stand serves to support the camera at the medium height of the eye, and is the best form to ensure the necessary steadiness.

Besides these a vertical glass or gutta percha bath for the sensitizing (nitrate of silver) solution, a level stand for developing, scales and weights, glass measures, a few stirring rods, funnels, glass-stoppered bottles, and sheets of glass cut to size (out of

No. 1 patent plate) are all the apparatus absolutely required in the collodion process. Some small pieces of apparatus, which serve to facilitate manipulation, will be found in Mr. Hockin's catalogue, but may be dispensed with.

Chemicals.

These are few in number, but require the utmost nicety in their preparation.

Iodized Collodion.—A liquid composed of a modification of gun-cotton (pyroxyline), alcohol, and ether. When good it should possess the following properties: it should be nearly colourless, and remain so many days after iodizing; on being poured over a glass plate and allowed to set slightly, it should be sufficiently tenacious to admit of being peeled off in moderate-sized pieces; and when dry it should present a film perfectly transparent and not perceptibly reticulate.

The Nitrate of Silver Bath, or Sensitizing Agent.

The following formula yields the best results:

Crystallized nitrate of silver .	5 drachms.
Distilled water . . .	10 ounces.
Dissolve and add—	
Iodized collodion . . .	2 drachms.

These ingredients should be shaken together at intervals for an hour, then allowed to repose twelve hours, and afterwards filtered through bibulous paper.

The bath should have a *very* slight acid reaction to work perfectly. This is known to be attained when blue litmus paper immersed in it is slightly affected in thirty seconds, and changed to a decided claret in a minute and a half.

Developing Solution.

Pyrogallic acid . . .	3 grains.
Glacial acetic acid . .	1 drachm.
Distilled water . . .	3 ounces.

Fixing Solution.

Cyanide of potassium . .	30 grains.
Distilled water . . .	6 ounces.

It is indispensable for the photographer to have a room from which *white* light can be entirely excluded; this is best accomplished by covering the windows with several folds of orange-coloured calico, but on an emergency a room may be entirely darkened and the plate manipulated by the light of a lamp with a yellow shade.

The amateur will most likely take his portraits in the open air,

in which case a yellowish blanket will form a suitable background. The sitter should not be placed in an excessive glare of light, as it is liable to give a false expression to the countenance. A sheet spread on the ground at the sitter's feet will prevent strong dark shades from being caused by the more prominent features. The light reflected from large masses of white cloud is the most favorable for portraiture.

Manipulation.

Cleaning the plate.—First wash the plate with a small quantity of strong cyanide solution, rinse it off with an abundance of water, and dry with a cloth kept for the purpose, then pour on the plate a few drops of a mixture of tripoli, alcohol, and ammonia. Rub this well all over the plate, and polish off with a piece of wash leather, cleansed, by washing, from the chemicals used in tanning it. When a plate is not perfectly clean, it will, upon being breathed on, show all its imperfections.

Coating the plate.—Having perfectly cleaned the plate, hold it by one corner between the thumb and finger of the left hand. Remove the stopper of the collodion bottle by the little finger of the same hand, and cleanse the mouth of the bottle from any dry material which may have accumulated there. Pour on the centre as much collodion as it will hold; then cause it to flow successively to each corner, avoiding the thumb; finally, pour back into the bottle, from the right-hand corner nearest the body, keeping up an oscillatory motion until it ceases to drip. Replace the stopper, and proceed to immerse the plate in the nitrate bath (previously placed in the dark room).

Sensitizing the plate.—The collodion on the plate should be allowed to set before it is placed on the dipper; and great care is required in this part of the process, as if the plate is immersed in the bath too soon it will be unequally sensitive, and if too late a great part of its sensitiveness will be lost. The plate should be plunged boldly into the bath, as every stoppage will occasion a stain; it should be kept immersed about two minutes, and then placed without delay in the dark slide, as if allowed to dry it would be entirely useless.

Focussing.—If a portrait be attempted, the sitter should be so placed that as much as possible of the figure may be in one vertical plane; all parts nearer than this being magnified, the more remote diminished, and both out of focus. If it be required to take an extended figure or a group, a diaphragm must be used, as is the invariable practice with landscapes.

Draw out the sliding portion of the camera until the image appears on the ground glass, then fix the camera and complete

the perfect adjustment by moving the milled head attached to the lens. It is usual in portraiture to focus on the eye.

When a perfect focus is obtained, put on the cap of the lens, and replace the focussing glass by the slide containing the prepared plate, draw up the shutter, and proceed to

The exposure to the luminous image. — You effect this by directing the sitter to keep the eye fixed upon a certain spot previously arranged during the focussing; then, requiring absolute immobility, take off the cap during a period varying from one to two seconds in a good light, to a minute or more in dark weather. Experience only can determine this. Replace the cap, close the shutter, and take the slide to the dark room.

To develope.—Hold the plate by the same corner as before, or place it on the level stand, and pour quickly over it the requisite quantity of the solution, mentioned at p. 575. Should this not flow uniformly, you may effect its due diffusion by pouring off the solution into the measure, and again pouring it on the plate, repeating the operation till successful. The first effect is the appearance of the high lights, these, if the plate has had the right exposure to luminous influence, are soon followed by the half tones, and quickly afterwards by the lowest tones—the shades of a black coat for example.

If a *negative* be desired, the development must be continued until the plate, held over a piece of white paper, or viewed by transmitted light, exhibits a tendency to become opaque in the high lights; or until the liquid on its surface is very highly coloured and muddy. It must then be *washed off* with a copious stream of water, and *fixed* in the manner to be presently described.

The developing solutions should never be kept for use a second time; they have done their work, and are almost, if not entirely, decomposed.

Fixing the image.—Free the picture by a plentiful stream of water from the remaining developant, and pour over it the fixing solution, allow it to rest until all the opalescent appearance, occasioned by the undecomposed iodide of silver, disappears; well wash by a plentiful effusion of water, and let it dry spontaneously, or by the aid of a spirit lamp.

Varnishing.—The proof being dry is liable to injury from friction, and even from atmospheric influences. It is rendered permanent by the application of a varnish; that composed of amber and chloroform is the only one entirely free from objections. It is poured over the plate in the same manner as the collodion, drained off into the bottle *without any rocking* of the plate, and within half a minute becomes perfectly dry and hard; in cold or moist weather it may be desirable to hold the plate near a fire for a few seconds, both before and after varnishing.

In directing the proper mode of developing the picture, it is assumed that the right exposure has been hit, otherwise subsequent operations will be wasted. In all these niceties of practice the tyro will of course take instruction from the photographic chemist who supplies the apparatus, and who generally throws in a few lessons gratis.

PRINTING FROM NEGATIVE PICTURES.

Apparatus.—Three glass or porcelain dishes, some pins bent like **S**, two glass rods, a quire of red blotting paper, a portfolio, and the pressure frame. (The latter item is a rectangular frame of wood with a rebate, serving as a support to a thick glass plate, backed by the pressure board, consisting of three pieces hinged together in such a manner that the outside thirds may be individually lifted without disturbing the remainder. The pressure is obtained by two screws working through cross pieces fitted into, and sliding in grooves in the frame).

As excellent photographic paper can be procured already prepared (with the exception of being sensitized), it will be unnecessary to describe that part of the process; we therefore proceed to

Sensitize the paper.—A few hours before it is required for use, take each sheet of salted paper, ascertain its *right side* (*i. e.* that on which the wire marks are least apparent), and mark it in the corners with a pencil; take it into the dark room, and *float* it on the surface of the silver solution, which is composed of—

Nitrate of silver, crystallized .	4 drachms;
Distilled water . . .	4 ounces;

carefully abstaining from wetting the back. When the paper loses its rigidity (usually in about three or four minutes) take it out, pass a pin through one corner, and hang it to dry on a line, attaching a piece of blotting paper to the inferior angle. Few sheets should be prepared at once, as they will not keep many days, even though preserved in a close dark portfolio. This constitutes the nitrated or positive paper.

The albumenized paper, which is now generally preferred, is excited in a similar manner.

Printing.—Place the negative with its back on the inside surface of the glass plate of pressure frame, cover it with a piece of positive paper, marked side downward, and interposing between it and the pressure board some elastic substance, such as felt, &c., press the whole into contact.

Turn the surface of the glass plate now upwards in such a way that the rays of light fall perpendicularly on it, and leave it until

a small portion of the paper (left purposely uncovered) assumes a dark maroon tint; then lift one portion of the pressure board and see if the high lights are sufficiently printed. You judge of this by their presenting a tint some shades darker than they ought to remain in the finished picture.

Remove now to a dark room, and immerse the paper for four minutes only in the Fixing Bath, consisting of—

Hyposulphite of soda . .	2 ounces,
Water	6 „

The proof will now have lost its fine colour and have become red; it will also appear somewhat bleached, hence the necessity of slightly *over-printing;* it must be well rinsed back and front under the tap, and immersed in the Toning Bath, consisting of—

Hyposulphite . . .	2 ounces,
Water	6 „
Chloride of gold . . .	4 grains;

where the red tone will almost imperceptibly become changed, and pass through all the tones of red brown, to a rich purple black; it may be taken out when the colour obtained suits the experimenter; the darkest pictures are considered the most permanent.

The proof should now be washed on both sides in a stream of water, then allowed to soak in a large quantity for half an hour; after twice repeating the streaming and soaking, the picture may be dried between blotting paper, and finished by passing a hot iron over it.

We conclude with a paragraph which has lately appeared in the public journals, respecting a new mode of Photography called the instantaneous, and which seems capable of registering a flash of lightning.

"On Wednesday morning last Mr. T. Skaife, known by his pho-
"tographs of the tracks of shells, &c., delivered a lecture at Mr.
"Hogarth's Gallery, in the Haymarket, on Instantaneous Photo-
"graphy, in which he related his experiments and experiences in
"obtaining views of discharges from cannons and mortars, steamers
"in motion, election meetings, &c., by means of his Pistol Camera,
"exhibited a large number of his original negatives and magnified
"prints, and showed his mode of proceeding. A negative was ob-
"tained in the room, by the Pocket-Pistol Camera, literally in the
"twinkling of an eye, and the lecturer dwelt at length on the value
"of the invention to travellers and military men."

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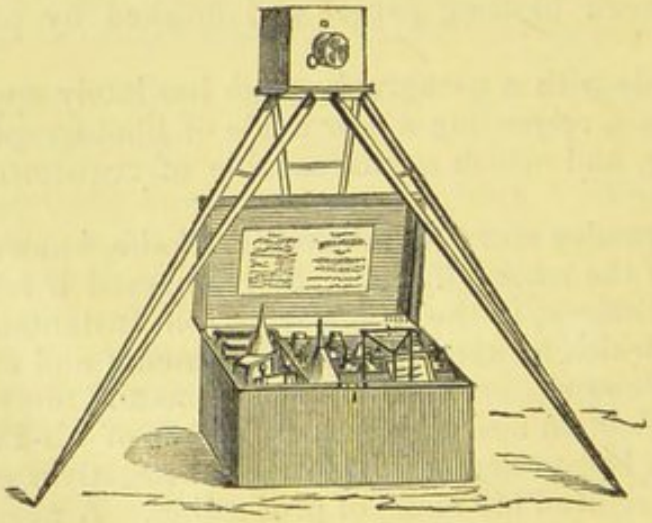
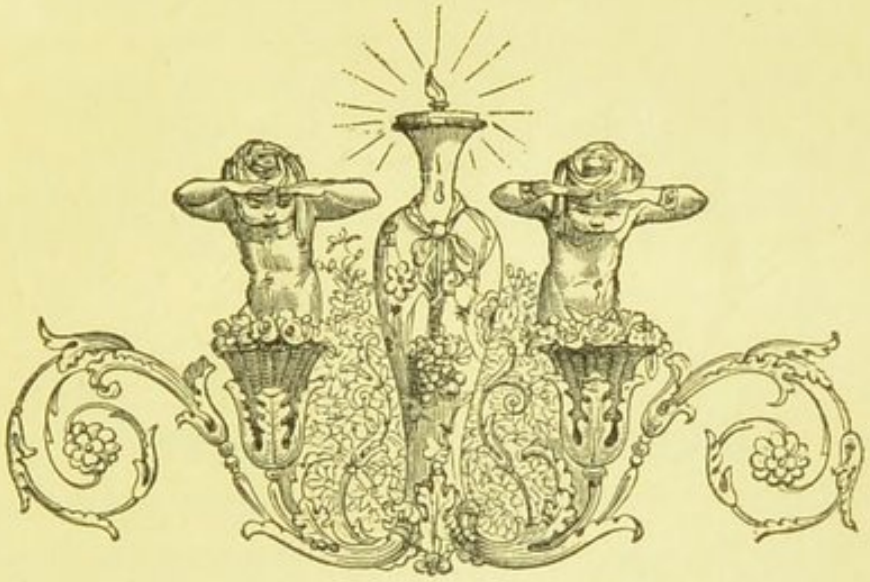
Assortment No. 3.—A No. 3 Camera, with best double Achromatic Lens and Stops, for Portraits $8\frac{1}{2}$ by $6\frac{1}{2}$, and an extra Lens for Landscapes 10 by 8, slides for the Collodion and paper processes, and an extra supply of Chemicals for the latter, £32.



CAMERA, APPARATUS, AND BOX.



L'Adieu,

The veil is drawn upon the Muses' bower;
Afar hath flown each Sylph's instructive pen;
Fair Science hath resign'd her regal power,
And Painting seeks her native skies again.

Unbent is Huntress Dian's shining bow;
Music hath ceas'd to sound her magic shell,
Or gay Terpsichore her grace to show;
And gray-rob'd Wisdom totters to his cell.

But here their various treasures are enshrin'd,
Or in the moral or the learned page;
And oft the reader, to improve her mind,
May seek, by turns, the Muse, the Gnome, or Sage

While he who thus (perchance but too unskill'd)
Presumes to bring their golden gifts to view,—
Slave of the Lamp, his ministry fulfill'd—
Makes his Salaam, and tenders his Adieu

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