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Household Administration

HOUSEHOLD ADMINISTRATION

HOUSEHOLD ADMINISTRATION

ITS PLACE IN THE HIGHER EDUCATION OF WOMEN

EDITED BY

ALICE RAVENHILL

AND

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PREFACE

The object of this book is threefold. (1) *It endeavours to define the importance and scope of household administration in the twentieth century, which, when analysed into its component parts, is found intimately to concern the right conduct and domestic care of individual human lives, from their inception to their close.* (2) *It seeks to demonstrate the necessity of an adequate preparation for all who assume the responsibility of such administration; particularly for those who, in consequence of their parental responsibilities, their wealth, their social status, or their professional duties, exercise far-reaching influence through their standard of life and example.* (3) *Finally, it gives prominence to the fact that the domestic arts are no collection of empirical conventions, to be acquired by imitation or exercised by instinct. It is clearly demonstrated that the group of sciences upon which they rest is more comprehensive than most people suspect, and that their contribution to the solution of pressing domestic problems has so far been but partially realised. It is, therefore, of considerable interest to observe the remarkable consensus of opinion on each of these points among the recognised*

experts in their subjects, to whom were entrusted the preparation of the various sections of this book. The writers of the papers, untrammelled by editorial restrictions, each writing from the fulness of her knowledge, tested by ripe experience, reached independently conclusions conspicuous for their unanimity. It will be evident to the most casual reader that, in the opinion of these thoughtful women, blind instinct must yield place to trained intelligence, if home life is to be preserved and modern conditions of existence adequately adjusted to human requirements.

Progressive changes, social, commercial, industrial, and, last but not least, educational, now require that this trained intelligence be fostered by organised instruction outside the home, adapted to the needs, present or prospective, of girls in every grade of society. Such instruction, whether in the fundamental sciences or in the applied arts, must be associated with individual practice in laboratory, studio, workroom, and kitchen; the details to be varied as circumstances dictate.

If, however, consistent applications of such knowledge are to be made in order that desirable saving in time, labour, money, health, or happiness shall be effected, graduate women of high attainments are urgently needed for the work. It is they only who can bring to bear upon the problems of childhood and adolescence, of food, of clothing, of housing, of domestic economics, of occupation, rest, and recreation, the patient study and research in the interests of humanity, which men of similar

standing have lavished upon the advancement of commerce and industrial processes. It is by their skilled labour in the almost untrodden field of domestic science that the millions of homes will benefit which are committed to the charge of women who possess neither time, opportunity, nor ability to carry out these indispensable investigations, but who can yet effectively fulfil their responsibilities, if they be supported by systematic training and organised common sense, based on sound knowledge.

It is in the hope of forwarding these objects that this book has been prepared.

ALICE RAVENHILL.
CATHERINE SCHIFF.

Nov. 1910.

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A BRIEF HISTORICAL SKETCH OF WOMAN'S POSITION IN THE FAMILY

By CATHERINE SCHIFF

A BRIEF HISTORICAL SKETCH OF WOMAN'S POSITION IN THE FAMILY

THE home must always claim the first place in the large majority of women's lives. It has done so in the past, it does so in the present, it will continue to do so in the future. But woman's activities are no longer to be merely confined to her own fireside, though that must always hold a prominent place. The real problem of the day is the right conduct of the home on scientific lines.

In some ways the management of the home has never been more difficult. The servant problem has never been more acute than to-day; the cost of living and the standard of comfort is going up by leaps and bounds, and the old recipe of "Feed the brute," as far as the husband is concerned, is no less inefficient. It is essential to-day to know something about food values, the arrangement of meals, which avoid monotony, and provide that requisite variety in nourishment, on which the good health and ultimately the good temper of the household depend.

Again we are realising the great complexities of all questions dealing with child-rearing and

education. We have travelled far from the self-complacency of the woman of thirty years ago, who based her claims to a thorough knowledge of the up-bringing of children on the fact that she had buried ten. This need for wider knowledge in all branches of housekeeping is equally important to the unmarried woman, who is more and more being called upon to act as a foster-mother, whether as a teacher or in some other capacity, to the nation's children.

The care of the children is considered by all shades of opinion to be the *clou* of a woman's life, and every day more and more responsibility is cast upon her in this respect. How can she, then, fulfil these duties as they should be fulfilled if she is utterly ignorant of the laws of health and of child-life, and how both are affected by environment and all the other grave and fundamental truths which lie at the root of the successful up-bringing and development of the child? It is now a hackneyed saying "that the child of to-day is the man or woman of to-morrow," but a whole world of truth lies enshrined in those words; the children are the assets of the nation, and if their up-bringing is not of the best they can never attain to that full heritage of development which is the right of every soul born into the world.

Scientific training in Household Administration can alone save the sorely taxed housewife of to-day from becoming more than a slave to her domestic responsibilities. It is only by being a

mistress of her craft, "whether China fall or no," that she can make sufficient time to devote herself to necessary self-culture and recreation as well as to those ever-growing outside duties which the twentieth century is imposing upon her in the shape of public and social work. If there is one thing which is becoming increasingly obvious, it is that the help and advice of scientifically trained women are absolutely necessary in the management of hospitals, the administration of the Poor Law, and the general solution of social problems.

At no other epoch in the history of mankind has woman stood on the same high plane as she does to-day, and at no other period has so much been demanded of her, intellectually, morally, and physically. It is only within recent years that Science has attempted to come to the aid of woman in helping her firstly to obtain, and then to maintain, the position for which she was originally designed, as the complement of man and as the chief element of preservation in human society.

If the history of mankind is traced back to primordial times, we find that it was the female who possessed power over the emotional nature of man, and it is becoming increasingly evident that the family owes its origin as a social factor to the Mother, not to the Father. Lippert is convinced "that the idea of an exclusively maternal kinship at one time extended over the whole earth," and M'Lennan says, "We shall endeavour to show that the most ancient system in which the idea of

blood-relationship was embodied was a system of kinship through the females only."

Occupation seems to have been the main factor in determining that the mother rather than the father should be the founder of the family. Agriculture originally appears to have been entirely the woman's industry, while the men were engaged in hunting or looking after the cattle, and wherever agriculture was the predominant feature of life we find that relationship is traced through the mother ; while on the other hand those tribes who were chiefly pastoral had a paternal system of relationship—that is to say, that descent was counted through the males.

Drummond, in his book on the "Ascent of Man," places the Evolution of Motherhood long before that of Fatherhood. "An early result, partly of her sex, partly of her passive strain, is the founding through the instrumentality of the first savage Mother of a new and beautiful social state—Domesticity—while Man, restless, eager, and hungry, is a wanderer on the Earth, Woman makes a Home!" And according to the same authority we find "that to Man has been assigned the fulfilment of the first great function — the Struggle for Life — Woman, whose higher contribution has not yet been named, is the chosen instrument for carrying on the Life of Others." Nature took many æons to make a mother, whose gift to the world was Love and Sympathy ; the evolution of the Father came still later. "It was when man's mind first became capable of making its own provision against

the weather and the crops that the possibility of Fatherhood, Motherhood and the Family were realised. "The Mother-age, with its mother-right customs, was a civilisation, as I have indicated, largely built up by woman's activity and developed by her skill ; it was an age within the small social unit of which there was more community of interest, far more fellowship in labour and partnership in property and sex, than we find in the larger social unit of to-day." [1]

In connection with this theory of the "Mother-age" it is interesting to note that the Etruscans traced their descent through the female line, and it was from the Etruscans that the Romans derived nearly all their institutions ; thus many of the "initiative forces of civilisation" have come down to us from women.

It is believed that the patriarchal system—where the man was the head of the family, as amongst the Jews—which succeeded the Mother-age, grew out of the custom of capturing women belonging to other tribes, this being succeeded later on by purchase, and "as soon as the woman ceased to be protected by the force of ideas, as soon, that is to say, as she lost her position as head of the family, her downward path was certain." But even among primitive people we find that it was an almost universal custom that a woman should be provided with an independent property, "Mit-gift," though as time went on and the patriarchal system became more firmly established, it appears

[1] Karl Pearson, "The Chances of Death," p. 3.

that this Mitgift became the husband's property, and that every bride was expected to bring a dowry to her husband, whose property she became, thus losing all independence.

However, in Greece the position of woman, during the Heroic times was to a certain extent an independent one, as is clear from the poems of Homer and the treatment of Homeric and Heroic themes by the Athenian dramatists. But one has only to compare the "Nausicäa" of Homer or the "Electra" of the Tragedians with the women of the time of Pericles, to see how much the status of the female sex had deteriorated. The Athenian wife of that time was treated as a mere "Hausfrau," expected to spend her whole time at home in the managing of the household, while the husband satisfied his intellectual tastes by intercourse with the "Stranger-women" attracted to Athens from other towns. "Thus arose a most unnatural division of functions among the women of those days. The citizen-women had to be mothers and housewives—nothing more; the stranger-women had to discharge the duties of the companions, but remain outside the pale of the privileged and marriageable class."[1] To this artificial condition of domestic and social life may be partly attributed the downfall of Athens, for it is impossible to divide the functions of woman without serious risk to State and race.

[1] Donaldson, "Woman," p. 58. Longmans & Co.

In ancient Rome the patriarchal system was the prevailing custom. Under the Roman law the husband was the only member of the family possessing legal rights. "The family (*familia*) in its original and proper meaning is the aggregate of members of a household under a common head; this head was the paterfamilias, the only member of the household who possesses legal rights."[1] It is true that there were many honoured women under the Roman Republic, such as Cornelia and Portia, the daughter of Cato, but the lot of the majority was not an enviable one. Gradually, however, the tutelage of women became less severe, and Justinian in revising the whole Roman code placed married and family life on an altogether new basis, "the husband lost his absolute control over his wife's dower, and in case of separation he had to restore it entire."

Women had been for so long under such strict tutelage that they were unfit to benefit by these new laws. Doubtless it will be remembered that the corruption of the women of the period is practically unparalleled in history, but it must be also borne in mind that the whole system of Imperial government was so vicious that it was almost impossible for women to escape from the widespread influence of vice and corruption.

Christianity as a force began to make itself felt while woman was yet in this low moral state, and

[1] Greenridge, "Roman Public Life," p. 18. Macmillan & Co.

it is not therefore surprising that to the leaders of Christianity the freedom which women then enjoyed and the easy method of divorce obtainable were in a large measure responsible for the vitiated state of Roman life. In their eyes the only means of producing a more salutary state of affairs was to put a check on what they considered a menace to a Christian society.

It is of interest to notice how the attitude of the Early Fathers towards women differs from that of Our Lord as recorded in the Gospels. There indeed are women highly honoured, and it is to a woman that Christ often gives a message of the highest import. It was to Mary Magdalen that the Risen Lord first appeared and bade her tell the others, and again it was the woman of Samaria who became the instrument of salvation to her people. But to the Early Fathers the ascetic ideal was the predominant one, and in consequence thereof women were treated as the chief source of temptation to man. "Woman was represented as the door of Hell, as the mother of all human ills. She should be ashamed at the very thought that she is a woman. She should live in continual penance on account of the curses she has brought upon the world. She should be ashamed of her dress, for it is the memorial of her fall. She should be especially ashamed of her beauty, for it is the most potent instrument of the demon."[1] In fact a decree of

[1] Lecky, "History of European Morals," vol. ii. p. 358.

the Council of Auxerre (A.D. 578) forbade women to receive the Eucharist in their naked hands owing to their impurity.

Unfortunately "the bigotry of the Early Christian teachers gave the first check to the tendency to freer institutions, the next was given by the fall of the Empire."

With the influx of the Teutonic tribes we find a new code of ideas and morals, but eventually a compromise was effected between the Germanic and Roman laws. Thus from very early times we find that it was a German custom to provide every bride with a dower, and this is remarked upon by Tacitus. Afterwards the Church adopted this custom, which was strangely enough both Roman and Teutonic in origin.

From the time when the Empire went down in a cataclysm which shook the foundations of the world, until the beginning of the Middle Ages, we hear but little of woman. It was the Sturm and Drang period in the world's history, in which woman had no real position. The women of the upper classes were of necessity confined either to the castle or the convent, and woman's sphere was therefore a small one ; man demanded nothing more than that they should minister to his physical wants in the short periods of peace he then enjoyed. Hallam says, "I am not sure that we could trace very minutely the condition of women for the period between the subversion of the Roman Empire and the First Crusade . . . there seems however to have been more roughness

in that social intercourse between the sexes than we find at a later period."[1]

With the end of this stormy period comes the dawn of the Age of Chivalry, and from that time forward until the Reformation, woman enjoyed a portion at least of her rightful position. It is said that "Chivalry not only bestowed upon the woman perfect freedom in the disposal of hand and heart, but required of the knight who should win her, devoted and lengthened service"; this may be, however, a rather idealised view of the situation; but there is no doubt that the Court and the Cloister became the two centres of women's lives, and an intimate connection was maintained between the two. Nearly all women of gentle birth were educated in nunnery schools, and by the eighth century we find that these schools had attained a high standard of learning, which increased and developed in the succeeding centuries. The convent afforded a shelter to the woman who did not marry and to whom the marriage state did not appeal; there she was able to a certain extent to follow the career she desired, at the same time her personal safety was assured. "The scholar, the artist, the recluse, the farmer, each found a career open to him; while men and women were prompted to undertake duties within and without the religious settlement, which make their activity comparable to that of the relieving officer, the poor law guardian,

[1] Hallam, "History of the Middle Ages."

and the district nurse of a later age.",[1] It is perhaps of interest to us to note that the first hospital for lepers in England was founded by a woman, "good Queen Maud," in 1101 at S. Giles' on the East.

The rule of an abbey or a priory called for no mean business capacity on the part of their heads, and as a rule the abbess and prioress were women of great business and administrative ability. Before the Norman Conquest nearly all the nunneries founded in England were abbacies, subsequently priories were the most usual foundations, as according to feudal law women were unable to hold property.

The latter half of the fifteenth and sixteenth centuries are renowned throughout history for their women, who, occupying foremost positions in the government, were clever, cultured, and liberal-minded. One has but to mention the names of Margaret, Countess of Richmond, the "Lady Margaret" of Oxford and Cambridge; of Leonore d'Este, the mother of equally famous daughters, Isabella and Beatrice d'Este; Marguerite de Valois, sister of Francis I., and Isabella of Castile, to conjure up before one's eyes the whole procession of the proud and capable women of these days.

"One and all have been fruitful as successive stages of growth, yet they can never recur, and only the fanatic or visionary could wish that they

[1] Eckstenstein, "Woman under Monasticism," p. 106.

should recur, for each is narrow and insufficient from the standpoint of a later age."

In England "the women who were the mothers of the men who created the great Elizabethan epoch were almost without exception brought up in nunnery schools" [1] and, alas, the destruction of the nunneries and the rise of the Puritan spirit sounded the death-knell of women's education. After the Reformation the position of woman was peculiarly degrading; in the eyes of the law she possessed practically no status, and "the old chivalrous feeling for woman seems to have faded out with the romance of the Middle Ages—she now figured as the legal property of man, 'the safeguard against sin,' the bearer of children *ad infinitum*."

So woman was left once more to sink back into a slough of despond, until with the end of the eighteenth century there arose the humanitarian movement and the gradual awakening of woman to the sense of her responsibility, with the inevitable corollary of her rightful position as the social equal of man.

If these ideals are to be realised, woman must recognise her responsibilities and act accordingly. She has proved herself a more than apt student in all the liberal studies, she has practically forced the door of nearly all the professions, now she must realise that she must apply her higher learning to what is probably the most difficult profession of all, the management of the home, or in other

[1] "The Mediæval Education of Women in England," *Journal of Education*, June 1909.

words she must see that the knowledge she has acquired be adapted and turned to practical aims.

Up to the present time the conduct of the home has been regulated purely by rule of thumb methods; if however in the future it can only be administered with the same method and scientific exactitude as prevail in other great business enterprises, the drudgery of housekeeping will diminish and woman will cease to be a slave to household duties. She will have more time to devote to the cultivation of her own mind, and thus, while becoming a more real companion to man, she will be free to take a more enlightened interest in the education and development of her children.

"Incidentally this may go to prove that a sound knowledge of the household sciences and arts may serve, not to tie a woman more to the storeroom and kitchen, but to enable her to get better results with the expenditure of less time and energy, by enabling her to apply to everything simple and complex within the household the master-mind, instead of the mind of the uncertain amateur."

Her responsibilities are great not only as an individual but as a member of the community to which she belongs; and if she is to fulfil these responsibilities in respect to the home, she cannot do so without a thorough scientific preparation.

The home is the "cradle of life," it was the birthplace of those industries which to-day form the great centres and constitute the means of livelihood for millions. In some of these there is reason to believe that woman took her share as

originator. With the process of time, these primitive practices have grown into the great industries and arts of to-day, yet it is still to the woman that the call comes to cultivate and use her taste in these matters, so that when it falls to her to be responsible for the decoration and furnishing of a house, she may be able to choose in all departments of life what is *the best*, to the everlasting benefit of herself and her family, both physically and morally.

If man be the producer and distributer of wealth, woman is certainly the director of consumption. On her rests the responsibility of expending wisely and well the money entrusted to her for the nutrition and clothing of her family, and how can this be adequately fulfilled if she have no real knowledge of the subject beyond what she is able to pick up as she goes along, a method detrimental to all concerned? Little would be thought of any business house which entrusted its most delicate operations to inexperienced buyers, or of any municipality which allowed its affairs to be conducted by an amateur. Far less would be heard of misery, poverty, and ill-health if the art of buying and preparing food, for instance, were properly understood by those whom it most concerns.

Again, the chief racial responsibility falls on woman; it is just in the most precious years of childhood that her influence is so potent, and it is the mother, who besides helping to sow all the ethical and spiritual seeds, should safeguard the perfect physical condition of her children, in

order that an unimpaired vitality and constitution be handed on from generation to generation. No proverb is truer than "Mens sana in corpore sano"; the two go hand in hand together, and their accomplishment is the proud privilege of the woman.

From the family flows the life of the nation, and the power to guide it aright lies largely in the hands of women, whether they be married or single. With the married woman her own family comes first of all, and then through it her duty as a citizen; the unmarried woman's duties as a citizen are manifold, and each year they increase and expand. Nearly all the activities of public life are open to her; for instance she may sit on County Councils, Municipal Councils, District Councils, urban and rural Parish Councils,[1]

[1] It is interesting, however, to note the following Electoral Disabilities for women in England and Wales, which, however, do not exist in Scotland or Ireland:—

No married woman can vote in any Town Council election or in any County Council election outside London.

No woman owner has any right, in virtue of her ownership, to vote in any local election. Until 1894 women owners, as such, were entitled to vote in Poor Law Guardian elections, but the Local Government Act of that year disfranchised them, while enlarging the voting rights of men owners.

No woman lodger can vote in any local election, although men lodgers can vote in District and Parish Council and Guardian elections, and in the election of the London County and London Borough Councils.

For women there is no service franchise—such as entitles men to vote in District and Parish Council and Guardian elections, and in the election of London Borough Councils—*i.e.* no occupation of a dwelling as an official or servant (for example, as matron or caretaker) entitles a woman to be placed on the Register.

For neither men nor women is there any ownership franchise, lodger franchise, or service franchise for Town Council elections or for County Council elections outside London.

Boards of Guardians, &c.; in fact in the growing field of social work, her services are being more and more recognised as indispensable, and it is impossible in a few words to enumerate all the possibilities of service which lie before her, both professional and philanthropic.

Consequently if a healthy nation is desired, the women of a country must be educated both academically and scientifically. "If women are to be fit wives and mothers they must have all, perhaps more, of the opportunities for personal development that men have. All the activities hitherto reserved to men must be open to them, and many of these activities, certain functions of citizenship, for example, must be expected of them. Moreover, whatever the lines may be along which the fitness of woman to labour will be experimentally determined, the underlying position must be established that, for the sake of the individual and race character, she must be a producer as well as a consumer of social values."[1]

Now how is this most desirable end to be attained? The succeeding papers will deal with the subject *in extenso;* here can only be briefly indicated the scope and purpose of the majority.

An eminent authority tells us that "the objects of nature may be designated as the objective point of view. It is the standpoint of biology and affords the natural conditions for the success-

[1] Parsons, "The Family," p. 316.

ful investigation of the laws of life, not only of the lower organisms but of the human race as well."[1] This immediately demonstrates the vital necessity that women should know something of these fundamental laws of life, which biology alone can teach, in order that she may apply these to her ordinary daily life and recognise them as operating in all her surroundings.

The transition from this stage to the next is an easy one. Woman having learnt the laws of life, will immediately view her economic responsibilities with a clearer eye and fuller understanding. It is true that throughout the ages woman has striven to acquit herself as best she could, but until the present day it has mostly been a groping in the dark, without the aid of any exterior agency. Now light is beginning to be thrown on many points hitherto obscure.

Household economics has been well said "to rest on two chief cornerstones, the economy of wealth and the economy of health, and encloses the groundwork of human happiness and human aspirations . . . even all departments of science must contribute to its development."

But a mere knowledge of biology and economics is useless without bodily efficiency, and true bodily efficiency is only possible where the environment is favourable to growth and life. It cannot be expected that full physical development can ever take place in ill-lighted, badly ventilated,

[1] Lester Ward, "Dynamic Sociology," vol. ii, p. 120. D. Appleton and Co., New York.

defectively drained or otherwise objectionable houses. And it must never for a moment be forgotten that if the body be neglected, then, as an inevitable consequence, the mind and spirit must also become warped. It is not that we desire man to develop his physical nature at the expense of his spiritual, but rather that we would see him placed in such a condition that he is able to apply those great faculties, which distinguish him from the brute creation, to their highest and best use.

The ancients recognised in very early times the need of sanitary precautions to protect themselves from the onslaught of disease and the consequent decimation of their race.

We find Mena, King of Egypt (5000 B.C.), mentioning in his Ordinances that offences in diet were one of the things through which "the genius of death becomes eager to destroy men."

The Levitical Laws contain many enactments of a sanitary character, they are one of the oldest known sanitary codes, and have many wise and necessary provisions for the health of the people.

Rules for the conduct of rural life were formulated so far back as 100–500 B.C. in Bœotia. Tarquinus Priscus began and Tarquinus Superbus completed the great works for the drainage of Rome in the fourth and fifth centuries B.C., of which the Cloaca Maxima was the most remarkable feature ; even to-day the ancient water-supply of Rome and her system of baths are still a source of admiration to the modern world. And

to their credit be it said that the Romans carried this knowledge with them to the countries which they conquered; we find aqueducts at Great Chester and Lanchester, an arterial sewer at Lincoln, and the well-known baths at Bath.

From the destruction of Rome until well-nigh ten centuries later was a period in which no advance in sanitation was made; on the contrary, retrogression was the keynote of the time. Warfare, religious segregation, and the spread of asceticism were the chief reasons for this; the ideals of both Christian and Pagan were opposed to personal and public hygiene. "The ascetic violated all laws of personal hygiene, the monastery's ideal was inconsistent with public hygiene, and both glorified God by teaching submission to pestilence,"[1] which from time to time swept over the country, devastating it from end to end.

But with the increase of trade it became necessary to adopt certain measures for the preservation of human life, and in 1348 we hear of the first street-cleaning and quarantine in those two great centres of commerce, Venice and Cologne. It was in the same year that the most terrible plague which the world has ever known attacked Britain and practically depopulated it, finding its chief prey in the filthy streets of the City. This led in 1379 to an Order in Common Council for keeping the streets clean. But despite this, all through mediæval times personal health was shamefully neglected and

[1] *Sanitary Record and Journal*, Nov. 24, 1904.

public health practically unknown. The consequences are easy to trace ; the country was again and again swept by epidemics which were naturally followed by severe famines, and thus on every side progress was checked. The Fire of London at least cleansed London of its filth, and from that time forward matters began to improve. All through the eighteenth century, smallpox, typhus, scurvy, and ague were rampant, and it is not till 1834 that we find the beginning of sanitary legislation. In 1837 the Act for the Registration of Births and Deaths was passed, which at once provided the indispensable foundation for reliable statistics ; previous to that date all that there was to depend upon were the Baptismal Registers and the more or less accurate Bills of Mortality. This has been followed by a long series of Public Health enactments concerned with practically every department of life. In fact during the last fifty years the public conscience has been quickened to an extraordinary degree. Much however has yet to be done which cannot be touched by legislation, and it is to the woman, who has been trained in the right conduct of life both private and public, that the world looks for the preservation of healthy human life, much of which is now needlessly sacrificed on the altar of ignorance. In many cases the woman is the only person who can prevent this, therefore she must equip herself for her high and noble duty with all that Science can provide and Art can suggest, neither must

she forget that her own home must ever be the starting-point of every endeavour. For the "Mrs. Jellabies" of this world are not those who help forward its progress, rather are they the clogs on its wheels.

Not only charity, but all other virtues begin at home. "So long as the first concern of a nation is for its homes, it matters little what it seeks second or third."

THE PLACE OF BIOLOGY IN THE EQUIPMENT OF WOMEN

By WENONA HOSKYNS-ABRAHALL, M.A.
(Dublin)

THE PLACE OF BIOLOGY IN THE EQUIPMENT OF WOMEN

In considering what is the best mental equipment for women in civilised countries it is as well not to contemplate only the great general facts of life, such as wifehood, motherhood, and the woman's position in the household. It is necessary to take into account also the special characteristics and circumstances of our own times and civilisation; for, unless a woman is prepared to meet these successfully, she cannot be deemed adequately equipped, even if from other points of view her education be ideal. In the beautiful old-fashioned education of Japanese women we have an instance of such ideal excellence, which is yet proving unable to cope with the requirements of actual life in modern Japan.

The most striking, and also the most radical and pervasive, characteristic of our time is, of course, the progress made in scientific knowledge. Month by month enormous numbers of facts are, in every department, added to the knowledge already acquired. To let one's imagination range, even in a cursory way, over the work that is being done in

chemistry and physics merely as they concern biology—to enumerate the subdivisions of these sciences, or to look down a list of recent publications relating to research carried on in them, is enough to make one's brain reel.

This ceaseless widening of the borders of knowledge is, we must gladly allow, most inspiriting; and yet, seen from another side, it may well give rise to fears. For it is fairly obvious that the progress of human happiness goes by no means *pari passu* with this progress of knowledge; and, on looking more closely, we may even observe miseries and degradations which can be traced up directly to the practical application of some of those scientific discoveries.

To what must we ascribe this? It would seem to be the outcome of two lines of tendency just now predominant.

The first of these is that very strong bent towards mere accumulation of fresh facts which may be noted in the most able and active workers all over the world. Just as, in other times, the best minds have flung themselves with enthusiasm upon art or literature or philosophy or statesmanship or war, so now they fling themselves eagerly upon the discovery of more and more recondite truths in science—leaving the ordinary government of affairs, on the whole, to minds of the second order.

The next is the reckless way in which isolated scientific discoveries—more especially in physics and chemistry—are brought to a practical applica-

tion and introduced into the scheme of everyday human life. This is done without consideration of anything beyond ensuring some obvious superficial convenience, and—what is a principal determinant—the opening up of new financial enterprises. Advantages of a sort no doubt are won—but often only at a fearfully disproportionate cost. The game—if we would but look at it unconventionally, from the standpoint of true biological science—is not worth the candle; for it involves a sacrifice of life itself to what can hardly be considered even as the means of life.

Thus the chemicals used to preserve food impair its nutritive qualities; while other chemicals, as well as a number of ingenious mechanical processes, serve to facilitate adulteration. We all know how difficult it is to obtain pure milk and butter, or pure bread from pure flour, or jams made with sugar from fresh and good fruit. Bread may be made from flour which has passed through no less than seven processes,—a sad contrast this to the old home-made bread, the product of home-ground meal, whole and sweet as nature made it. What is sold in enormous quantities to the people as sugar, whether alone or as part of preserves, turns out often to be glucose. Butter, so-called, is often only skilfully-treated fats, the weight helped out by water. These three articles of diet alone, when adulterated as they thus often are, mean serious deterioration in the food—and therefore in the physique—of the nation; and to them we have

yet to add the effect of the chemicals used for keeping fish and meat in place of the genuine, old-fashioned pickling, salting, and smoking.

Machinery, again, growing ever more and more complicated, has destroyed an incalculable wealth of traditional activity: and therewith, generation by generation, it tends to destroy the finest capacities of individual men and women, whether producers or consumers of the finished product. The consumers suffer through the lack of opportunity to acquire and exercise manual dexterity and resourcefulness—as well as through a great lack of experimental knowledge. The producers suffer through the monotony and narrowness of their labour.

We may take as other instances of recklessness our common use of unprotected illuminants —electric light and incandescent gas-mantles— which give off ultra-violet rays injurious to the eyes; the use of portable electric lamps and switch lampholders, which is by no means free from risk; and again the extreme recklessness of the so-called "medical electrician," who will actually venture to give electrical massage to a patient immediately after wet pack.[1]

As a last example we may take the rage for speed, and in particular the use of electrically driven motor-cars. The exact effects upon the human frame of the rapid motion, of the vibrations, of the presence of the electric current and escaping gas have never been adequately investigated—though

[1] "The Electrical Resistance of the Human Body." Gee and Brotherton, Manchester Lit. and Phil. Soc., 1910.

sundry ill consequences of motor-driving have been noted without any diminution of the practice.

A very cursory reflection may show us that, while the progress of science is the great characteristic fact of modern life to which we all have to adjust ourselves, we must be prepared not only to take advantage of the good it offers, but also to discern and counteract the perils it brings with it, when applied to human life in our present somewhat random way.

The random nature of our proceedings may be illustrated from yet another side. There are a number of facts and principles, long since agreed upon as truly ascertained, which have never, or only very partially, been brought to bear upon custom and daily life. We all know that plenty of fresh air is a first condition of health and vigour; and are so far convinced of this verity that open-air treatment is generally accepted as the proper mode of attacking and mastering consumption. Yet we crowd together into cities: our houses are often very imperfectly ventilated, and our public buildings—churches, theatres, halls, schools and institutions, as well as our railway-carriages and tram-cars—provide only for the very minimum of change of air. Similar neglect of definitely ascertained facts may be seen in dress, in food and drink, in furniture, in occupations. Noise is well known to be injurious to the brain, and destructive to thought: more than that, it has been discovered that it is harmful to the viscera. We insist, more or less, upon quiet

for the sick : but no trouble is taken about quiet for those who are well. Our thoroughfares echo with noises of all kinds, from the roar of traffic to the howling and whistling of errand-boys ; and the authorities would be much surprised if they were accounted specially negligent for not making some effort to suppress them. Yet to any biologically trained person this noise must appear not disagreeable merely, but a real handicap to the health and energy of the community. Wherever faithfulness to scientific principle involves trouble without prospect of money-making, it is likely to be shirked, however great the benefits known to come from it.

This is not entirely due to laziness, nor yet to ignorance, it is due quite as much to circumstance and to the pressure of our present social institutions. It is closely bound up with the great social question of the ownership of land, and with the husbandry and use of the resources of the land, our rivers and our sea-shore. Wasting a great measure of what these have to give us, polluting them in different ways by our manufactures and by the refuse of our cities, we are constraining whole masses of our population to look to the work and the products of other countries for the first necessities of life. Whole masses of our population are removed from direct contact with the soil, which is the nursing-mother not only of the body, but also of the mind of man ; the people and the land being thus alike impoverished. Inquiring how so dangerous an error can have

arisen, we may find at least part of its cause to lie in an ignorance of the fundamental principles of biology, the science of life.

What, it may now be asked, is to be done to counteract these disadvantages and dangers? And, again, how does all this bear on the equipment of women?

Taking the latter question first: it is indisputable that an enormous proportion of our commerce and manufactures is concerned with food and with articles required for the home. But things for the home are made to be dealt with and used by women. In so far as science comes in and modifies this material it is imperative that women should be placed in a position, not only to know what are the essentials for life, but also to criticise and estimate accurately that which is offered to them as scientific improvement. For we need, in this connection also, to remember that science can only be fought by science—that is, by knowledge belonging to the same plane.

We have now in part answered our former question. What we need is a central or basal science to which—for practical purposes and in regard to its practical application—the work done in other sciences can be brought to be accepted, or rejected, or modified. This central science can, in the very nature of things, be none other than biology: the science, that is, which gives an account of the functions and inter-relations and structure of all living things, and deduces there-

from those principles which, in a rather loose way, we speak of as the laws of life.

It would, we think, be a very happy turn of affairs if, not all, but some of that genius, which is now spending itself in the research for fresh facts, could be diverted to the work of correlating with one another facts already known, and bringing all those that are appropriate to be grouped as it were in order of service around biology.

But perhaps not less important than this is what we may call the practical synthetic work of women in their households. There are, indeed, two circumstances which would give the ordinary woman of average intelligence, if she were but adequately instructed, some advantage, so far as the service of mankind goes, over even the most brilliant man of genius. The first is the vantage-ground of her position in the home—at the very point, that is, where so many sciences thrust themselves up together to the surface of actual life—where in some way or other, however roughly, they have to be correlated, compared, their different claims adjusted. The second is the natural inclination of the womanly mind towards synthesis rather than analysis, towards practice rather than theory.

We ought now to consider rather closely—exhaustively we cannot—what is included under the term Biology. It sood for some time chiefly to mean an account of the structures of animals and plants, structure being pursued into ever further minuteness, down to the cell and the constituents and parts of the cell. With this has

gone insistent inquiry into the process of reproduction and growth; and more lately, in biochemistry and bio-physics, the conformity of living substance to the order recognised in non-living matter has been, and is being, most eagerly investigated. And now a school of biologists is arising whose aim is the vindication of the claims of function as against the too exclusive study of structure. Function, of course, involves activity; and activity, in a complex, multicellular organism, involves the interplay of parts. This interplay, again, cannot be studied without reference to the environment, and to the relations between the organism in question and others—whether of its own or of other species. In this way it seems likely that biology—moving as it were in a spiral—will by-and-by return, though at a much higher level, to the standpoint of the older naturalists, whose interest in plants and animals was focussed more upon their activities, habits of life and special environment than upon their morphology—and even disdained not to consider their possible uses for man. Also, more thoroughly and extensively than before, the study of man himself is being caught up into the great web of Biology. It is seen as an integral part of Biology, and pursued in the biological spirit. Whether we look to psychology on the one hand, or to anthropology and its associated sciences on the other, the present is a most propitious moment for drawing public attention to this vast science, as being the true centre and foundation of that practical knowledge which is

needed as a guide, and also as a stimulus, for practical everyday life.

It will, of course, be instantly objected that the subject is indeed vast—much too vast. But not too vast, surely, if, by means of a very simple principle, we select out what is of immediate definite use, and necessary for everybody, from what may be, by the majority, safely left on one side. We shall then get, on this side, the highly specialised Biology of the laboratory with its minute researches and nicely calculated experiments, and, on that, what we may, for our present purpose, call Common-sense Biology.

Just one word of explanation is perhaps needed at the outset. Common-sense Biology does not mean anything like that slipshod dealing with miscellaneous phenomena of nature which sometimes goes by the name of Nature Study. It is a course of work systematic and strictly scientific, conducted as truly as any other in the scientific spirit. It presents, however, two points of contrast with special or analytical Biology, in that, whereas, in analytical Biology, a beginning may be made practically anywhere, with any series of facts one may prefer to take first, in Common-sense Biology there is only one right mode of starting, and that of the utmost importance; while, secondly, Common-sense Biology combines some of the characteristics of an art with the ordinary characteristics of a science.

COMMON-SENSE BIOLOGY

It is this latter form of the science—this science, which is also an art—that we would advocate as essential for the equipment of women. With this view let us examine it further.

And first, what is its proper starting-point? Its proper starting-point is accurate instruction concerning the living things with which the student is, or can easily be, brought into immediate practical contact. And, again, in the study of these living things—plants and animals alike—attention is directed first towards the organism in its totality and in its activities—towards function rather than towards structure; and also towards mode of life, relations with environment, and, where possible, towards its use or danger to mankind. Structure will, no doubt, early have to be introduced, but only in its larger details as explanatory of function, for the sake of a better knowledge of the animal or plant as a whole.

What are to be the types and examples of organisms studied?

This is an important question, and the writer would most strongly urge that the principle of selection should be that of locality; that the student should start with those plants and animals —both wild and domestic—which are to be found within a given radius of the place where she is living and working. The first things to know about are habit, activity, inter-relation and use to

human beings. In respect to these, the presence of one organism will react upon others, and therefore no plant or animal within the area should be lightly overlooked.

THE IMPORTANCE OF BACTERIOLOGY

We must not, however, confine attention to the higher multicellular animals and plants. One of the most important factors in the environment is the existence of bacteria ; and it is of great importance that an outline of bacteriology should be included in our course of Common-sense Biology. This outline should be kept close to the common necessities of everyday life. For the sake of making clear and real to the mind the manner in which bacteria multiply and the extreme rapidity of the process, a certain amount of microscopical work ought to be done, the examples being few, but carefully chosen. This kind of work, nevertheless, should be kept subordinate. The effects wrought by bacteria in water, earth and air, in stored food-stuffs, and in the tissues of the living body are the important subjects for study ; and naturally, connected with these, the conditions which permit the access of bacteria or which, in the case of noxious bacteria, will best ensure protection.

The rationale of toxins and anti-toxins, with the relations of these to the blood-serum should also, in a general way, be known ; and moreover the student should be prepared to learn that many

diseases, which are at present very imperfectly understood—we may take, for instance, forms of insanity—have their *vera causa* in the action of toxins, and require to be treated accordingly.

Perhaps, for those who cannot take more than the shorter courses of our Common-sense Biology, it will be sufficient to consider only those forms of inimical bacteria which we have to combat in our own islands. But the writer would strongly urge that, at least among women of the leisured classes, this instruction should be extended to cover the bacterial and other minute parasitic forms of disease most prevalent in our colonies and in our foreign possessions. The wives of officers, civil servants and missionaries ought to know, in a clear, scientific way, the causes, modes of attack, and methods of prevention of the principal tropical diseases, so far as these have at present been made out.

METHOD OF STUDY

What should be the method of this study?

The sketching out of a course would be far beyond the scope of this paper. Here it may only be said that the work must, of necessity, fall into two main parts. There must be, on the one hand, field-naturalist's work, for the greater proportion of the animals and plants studied ought—so far as is in any way practicable—to be observed in their natural surroundings; and there must be, on the other hand, work allied to that of the gardener and farmer, the rearing of selected

plants and animals for purposes of experiment and of closer examination. Nothing worth mentioning can be done on either of these lines without some study of the food and climatic conditions required by each creature; and this will involve a study of soils, temperature, atmosphere, and so on—and also a study of the nutrient properties of those organisms which furnish forth the food of other organisms. From this knowledge, gained thus through direct observation and experiment, would be deduced the general principles which—so to express it—govern life; and upon it as foundation would be reared the more specialised knowledge of all that pertains strictly to the life of mankind. Throughout the aim should be to use books mainly for reference.

It is not necessary—as it might have been a few years ago—to show that a training on these lines is better, as a preparation for life, than that offered by the ordinary school and university curriculum; but it may be worth while to show how far and why it is superior to a well-planned course in the analytical biology of the laboratory. The superiority is surely twofold: in that the kind of knowledge acquired is of greater practical utility; and, again, in that the development which it ensures, to the powers, bodily and mental of the student, is more varied, thorough, and effective.

COMMON-SENSE BIOLOGY AS AN ART

As has been said, this Common-sense Biology partakes of the nature of an art. Now it is

characteristic of any art that, for its satisfactory exercise, it demands not only knowledge, but also intuition;—not only conscious volition, reflection, and endeavour, but also subconscious nervous and muscular activity, and, together with that, a certain emotional state—a trend, tendency, disposition of the whole being, which likewise is chiefly subconscious.

Without such a disposition to begin with you cannot have an artist. Neither will you get an artist, if, on the other hand, this disposition is never given an opportunity for displaying itself and developing its capacities. You cannot play an instrument properly if you have no music in you, and the music in you will never come forth if you have no instrument to play upon. When disposition and opportunity are happily met, and the true artist arises, it is in the subconscious that the chief riches, gained by her work and experience, are stored, and from the subconscious that she draws her skill; while in the subconscious, again, lie the mysterious sources of original inspiration. We all know well how over-consciousness spoils art, as it spoils most kinds of action. The happiest effects, the loveliest deeds spring, as it were, spontaneously.

What is true of such arts as music and poetry is at least equally true of the art of living. The rich and well-harmonised subconsciousness is the proximate source whence all that is strongest and most beautiful in human activity is derived. The domestic arts, conversation, power of rapid judg-

ment at a crisis, the care of the sick, the care of children, tactful daily dealing with one's fellows, all these, and so much else, we recognise to be dependent for perfection upon practice; and that is only another way of saying that they depend on the efficiency and the character of the subconscious. But the character and efficiency of each person's subconscious being depend in their turn—not solely, yet principally—first, upon the knowledge she has acquired, and secondly, upon the actions she has habitually performed. Action and being, as we all know full well, are for ever acting and reacting upon one another.

Action is a more potent influence upon the subconscious even than knowledge; and when to mere activity there is added emotion—such emotion, for instance, as pleasure or love, or solicitude, or desire for truth—we may feel assured we have brought into play the most powerful of all the forces which, in an ordinary way, go to vivify and to form human character.

The subconscious is even more important for women than for men, because women have more calls upon their emotions, and more need for intuition, and also more need for general resourcefulness and skill. It is because the Common-sense Biology whose claims we are urging involves so much activity, such care, quickness of observation, patience and ready wit, that it makes a better preparation for life than the more highly specialized work in the Biology of the laboratory alone could be.

THE GAINS AND LOSSES OF CIVILISATION

Is there, it may now be asked, anywhere any definite evidence to bear out this contention. There is: and in abundance. For it, however, we must look away from civilised communities, especially from the educated portion of their populations. Civilisation, no doubt, gives much; but it also takes much away. It has taken away much of the traditional lore of women, and more and more of their traditional activities. This does not merely mean that the practical ability and knowledge of civilised women is greatly restricted; it means also that the peculiar intuitive wisdom of women—the fruit of a richly-stored subconsciousness—is much diminished. In capacity for pure thought the educated woman of civilised communities no doubt excels all the rest: in most other respects the barbarian or savage woman will—with some few exceptions—probably be found her superior, whether judged merely by her mastery of the conditions amid which she has to work, or, more broadly, by the amount of her real knowledge and the range of her effective capacities.

Take, as an example, the Eskimo woman, who is considered to represent the woman of palæolithic times. As there is no Eskimo Board of Education—no paraphernalia of Primary, Secondary, Technical, and other Schools, with their red tape and officialism—she is free to carry on the tradi-

tion of her ancestresses, and to rear, in the good old ways, children who grow up to be sturdy men and women. The preparation she had for her task was chiefly that of watching and imitating her own mother. Thus, as a child, she followed all the processes of turning the dead reindeer to account —learning thereby an economy and an unwillingness to waste which were essentially scientific—learning, too, subconsciously. She saw the flesh of the reindeer made into pemmican—cut into thin slices, and dried in the sun or in the smoke of a slow fire, then pounded between stones (the use of stones is worth noticing) and stored under a cover of melted fat, poured over it in due proportion. She saw the bones—after the marrow had been extracted from them—pounded down and boiled to get out the residual fat ; the horns set aside to make fish-hooks, chisels, needles, and fishing-spears, work for the long winter evenings ; the skin carefully dressed with a split bone and cut into shape to make clothing, and snow-shoes, thongs, bow-strings, fishing-nets, and so on. The very tendons make threads for sewing : and the garments thus fashioned are not only strong and serviceable, but beautiful with that particular beauty, which may perhaps be called barbaric, but which almost invariably denotes vigour and fulness of subconscious life. The Eskimo women also make their own boats and their own tools ; they are good fishers and hunters. Their year's work comprises an exercise of dexterity and quick wit of which the ordinary Englishwoman can have no idea.

We might take as another example the North American Indian woman, with her varied forest-lore ; but, since space is limited, let us pass for one further illustration to the despised Australian aboriginal. She too knows and does things worthy of our admiration and imitation. For instance the English housewife's preparation of the household food is nothing like so conscientious as the Australian's, whose proceedings have the keen disinterested concentration proper to a bit of scientific research. Thus, to take but one example of the processes connected with the preparation of one form of food—a seed of a species of eucalyptus : "With a hooked stick she pulls down the terminal branches of the tree and spreads them out to dry on a piece of ground cleared for the purpose. After allowing them to lie there for a period determined by temperature, she collects the distal ends of the branches, damps them and brushes the seeds off into water. For a period of two or more hours these seeds are kept soaking, but the water is repeatedly changed, so as to remove all traces of the 'gum.' After this they are dried and ground on a stone. Again, she builds their rough, but wisely devised home most carefully according to ancient tradition. She takes her little girl, armed with a miniature digging-stick, out to track the honey-ant with her, and to learn by the way what are the birds and beasts and plants, friendly or inimical, which surround their home-camp."

Alongside of this direct learning about nature goes the learning of the legends and traditions of

the tribe, together with the customary dances, rituals, and religious practices. The activity of savage life is everywhere such that no anomalies like our physical exercises are needed, —for the physique of the young men and women is as graceful, strong, and enduring as need be.

If we turn to savage or barbarian peoples higher in the scale we shall find their knowledge, abilities, and accomplishments higher and also more varied. But, on the whole, until we come to the average modern woman of a civilised community, we shall find that the women—through their happily developed subconsciousness — are equal to the best the community requires of them. They do not call their training Common-sense Biology, but that is what it practically is. They know all about their surroundings, and what to do therein. And grace and beauty wait upon what they do.

This ideal is not, however, quite without parallel among the more highly civilised peoples. The Greeks conceived of Athene, the great goddess of wisdom and of war, as also Athene Ergane, the Workwoman, the goddess of handicrafts in the home. In our own country—to take examples near to us and familiar—the names of Caroline Herschel, Jane Austen, the Brontës, Mary Somerville, and George Eliot not only attest the fact that exquisite skill in domestic arts is not, in a woman, incompatible with learning and genius, but may also lead us to suspect that the exercise of this

skill actually aided and furthered their better-known achievements.

In our civilised communities—from the point of view of the subconscious—women are in two ways at a disadvantage. First, excessive division of labour, with our dependence upon machinery, has made the life of the State far more complicated than in former days ; and secondly, the activity of the individual, from the same causes, is far more monotonous, far less well-calculated to bring out all her powers and train her being as a whole, than it used to be. Hence, as we said, women have lost a good deal subconsciously—even though, in consciousness, they may have gained.

There is nothing in which the character of the subconscious is more clearly seen than in a person's attitude towards the great mysteries of life : towards birth and marriage and death on the one hand—towards religion on the other. It is, of course, matter of common knowledge that in regard to marriage the customs of some savage tribes are what we should describe as licentious. A truer understanding of the savage mind has, however, mitigated many of the judgments passed even upon the worst of these practices—at least in so far as they were taken to indicate gross inward depravity on the part of the women. And among many peoples there are found laws and customs of real beauty and noble significance, witnessing to reverence, fine intuition, and real care for the highest good of the tribe. And in general of all savage races it may be said that whatever

their laws and customs are—though perhaps born of ignorance and selfishness—they feel seriously about them as about sacred things, and observe them scrupulously.

The better side is exemplified chiefly by the women. When anthropological work is more largely undertaken by women, and when, through their sympathy, the jealously guarded secrets of the women's tradition, now almost entirely unknown, are yielded up to us, it is probable that our conceptions of savage life and thought will have to be radically modified. However that may be, it is even now sufficiently well known that the women do not leave the question of reproduction and marriage to chance in the education of their girls. The girls are definitely, carefully, and it would seem often tenderly, taught ; and if, among some peoples, they are made to undergo great sufferings, a closer study usually reveals in these the effects of the long subjection of the women to the cruelty and uncontrolled passions of the men. All this should not blind us to the fact that the maternal instinct is here actively grappling with the great realities of life: and we may contrast this with the ways of the modern woman who, less developed in subconsciousness, is not so forcibly impelled to make any such attempt, and, for the most part, practically lets the whole thing slide. Here, as in other directions, the fuller development of the subconscious would compel and also enable us to correct a grave omission: while the know-

ledge necessarily acquired concerning reproduction and birth in the course of biological work would fill up that which has hitherto often been wanting even in the best-inspired women who have dealt with this question.

It must by now have been made clear that our object in advocating this Common-sense Biology is to recover what was excellent in the equipment of the women of the past, and to unite it with what is most excellent, and most germane to woman's life, in the methods and knowledge of the present. Since modern household life is deficient in the requisite opportunities we are obliged to have recourse to definite educational schemes. But education of this sort will assuredly continue to be necessary even after many improvements in the home have been brought to pass; because it will always be necessary to keep the knowledge and activities of women in correspondence with the advance of science. At the same time it is worth while to remember that the earlier the child begins to observe living things, to live with them, learn about them, and take care of them, the better the final result will be; while the ideally trained mother in the ideal home, herself practical and active, will be able to do more for her children in this regard than most people, perhaps, would now dream of.

THE INFLUENCE OF COMMON-SENSE BIOLOGICAL TRAINING ON SOCIAL WORK

Biological training of the order we have been considering is, we believe, desirable for all women in the interests, first, of the home and of the rearing of children. But it is equally desirable for the women who are not destined to be wives and mothers, and particularly so as a foundation for any kind of university work, even for the different literary or philosophical schools.

Here it is, perhaps, worth while to urge upon women the claims of the other great division of Biology, that of the laboratory. A considerable number of women who go up to the universities have, indeed, intellectual abilities deserving special cultivation, yet abilities which show no very distinct inclination in any one direction. These have been very commonly drafted into the study of history. It may be questioned whether some branch of Biology would not be better for them, and more useful to the community. Women working at Biology in the universities ought to serve, and to aim at serving, as the channels by which each fresh addition of scientific knowledge finds its way to, and its appropriate place in, the schemes of Common-sense Biology generally obtaining.

In another field—the field of public work—it is to be hoped that ere long a knowledge of biology will come to be considered a *sine quâ non* for women. It would be superfluous to point

out in how many kinds of public work women are gradually coming to the fore—in those especially which deal with education and with the care of the disabled. Already the influence and the peculiar gifts of women have in some degree made themselves felt; but these might operate much more powerfully if they were more commonly associated with scientific knowledge—with a knowledge of those branches of biology, more especially of bio-chemistry and bio-physics, which bear most nearly upon humanity.

It would take up too much space to give an account of the many ways in which biology is here of service: two great lines of utility may just be indicated as examples.

First, biology would lead to certain modifications of practice—particularly in our treatment of children, and of persons deemed criminal or insane. The biologist, when anything was amiss—before she pronounced any one to be mentally or morally unsound, defective, or bad—would presume, to start with, that there was some definite physical trouble to be set right, not necessarily anything dangerous in itself or mysterious. In New York they now make it a rule to examine for adenoids every young offender against the law, before punishing him; and it is amazing how often adenoids are found, and when removed carry the child's wickedness away with them. Adenoids and divers glands are responsible for a great proportion of youthful wrongdoing; and yet other physical troubles will account for a great

proportion of the rest. The writer herself once came across a young girl who was, in intention and attempt, a murderess—yet was so only through the effect of a common physical condition, easy enough to treat when once ascertained. Until our general conception of a child—or indeed of a human being—is a more truly biological one, framed more closely upon the facts of its bodily life, we shall have but little effective intuition into its state. And such a sound biological conception is not to be had apart from some good measure of sound biological knowledge.

When, however, the most careful observation reveals no local or definite mischief to be dealt with in the person under consideration, the biologist will still not hastily set him down as bad—or even as unsound or defective. He will next suspect that he is one whose physical organisation is not fitted for its environment: if he can be placed in a better environment perhaps he will grow better. If this change is, from whatever circumstances, impossible, the biologist in treating him, however troublesome he may be, will still never regard him as wholly responsible for what he is, will still try to ascertain the exact ways in which the environment presses injuriously upon him, and to help him in those definite particulars. If we desire the work of our reformatories and prisons and the disciplinary work of our schools really to be and not merely to appear effective, it is only by such nicely-calculated methods that we shall attain our object.

This brings us to our second point. Biology, when a knowledge of it is more widely spread among us, will assuredly work a change in public opinion. We have among us thousands of men and women whom we account failures in life; whose existence constitutes our gravest social problem. The drunkard, the wastrel, the thief, the prostitute—these are characters whom society thrusts out. They have proved themselves unfitted for their environment; they cannot act in it with any regularity or seemliness: its laws are not their laws. And the assumption most generally is that these are beings of a lower stamp than the average, unhappily surviving in, or at war with, an environment which postulates a nobler sort of men and women. Is it so?

The finer and more delicately poised a mechanism—whether it be chemical balance, galvanometer, electroscope or what not—the more sensitive is it to its surroundings. Thus the instruments once at Kew Observatory have had to be transferred to the wilds of Scotland to ensure their perfect working—rendered impossible at Kew by the noise and vibrations of encroaching London. Thus, again, the mind of Darwin required for its proper functioning the quiet of a study at Down, in the heart of the country. A ray of light will spoil a delicate experiment: the presence in an observatory of one steel key will hinder the work of the instruments. A boy commits suicide because of the noise of the factory in which he is compelled to work. A girl drowns her-

self because the worries of her home are intolerable.

The point I would press is that these different examples belong fundamentally to the same category. Whether it be the instrument devised by man, or whether it be the human nervous system itself, that which we are looking at is a mechanism too delicate for the cruel exigencies of an unyielding gross environment. We have but to reflect on one organ alone—on the exceeding fineness of structure, and nicety of adjustment, and definiteness of sense-limit, of the eye—in order to realise that the comparison between the human nervous system and the most delicate of our delicate instruments is more than justifiable.

How do we know, when dealing with any given drunkard, that we have not before us a fine, fine nature, to which the harsh and low conditions of our Western civilisation have simply proved intolerable? How do we know that, instead of blaming him and trying to adjust him to the world, we ought not rather to blame the world, and try to make it a fit place for him to live in?

This consideration—strictly scientific as it is—ought to have very great weight in that new department of biological work which has been named Eugenics. Before lightly saying of any stock that it is not good to breed from, or that it is good to breed from, pains should surely be taken to ascertain whether irregularities and disease evinced by members of that stock do not in

reality proceed from their superiority to their environment and to the average men and women about them. Individually they may be irreclaimable, yet, thrown out of gear, miserable and wasted as they are, they may be the carriers of the finest hopes of humanity, of a promise for the fulfilment of which we are not yet ready. Perhaps there is a tendency to be a little overhasty in our estimates of good and bad stocks to breed from. Perhaps we have not yet fully learnt either the significance of recessive characters or the importance of the mere fact that the unit-characters of a human being are immensely numerous, and their inter-relations therefore extremely intricate. And yet, again, perhaps we are too intolerant of variety, too eager for uniformity.

Here in England we have a mixed population, sprung from many diverse origins. The differences between individuals are many and great. Yet the majority of the population is thrust into the grooves of one educational system, and thereafter compelled to settle down to occupations and modes of life which are the same for thousands together. Any attempt to leave the common rut is looked at askance. What wonder that there are rebels, and that the rebels are unhappy! A society constructed in conformity to true biological principles, instead of suppressing variety would give it welcome as one of the most precious of national characteristics, and would purposely adjust itself and its systems with more

accuracy so as to give every sort and type of person the best possible chance for developing his or her peculiar gifts. In a society so constituted, very rare indeed would be the occurrence of insanity.

These considerations should have weight in yet another direction: in determining the counsel which ought to be given to girls as to the choice of a mate.

The importance of soundness of stock has here too been well brought into prominence by the workers in Eugenics ; and perhaps it may not be amiss to make one or two suggestions with a view to obviating a too narrow application of the principle of the sound stock.

We must remember, first, that disease is not necessarily evidence of unsoundness. Like some forms of moral obliquity, it may be merely evidence of a quality in the stock which renders it unable to tolerate a given environment. And this quality may be in itself an excellence of the most precious kind. This would be the true account of many cases of insanity, while others would be covered by the action of toxins on the brain. Heredity, we are told in many instances of "insanity," is more probably a heredity of "special liability to the production of toxins or to the action of toxins on the brain," than heredity of insanity proper. This view will naturally entail modifications in our methods of treating the "insane," as well as a considerable change in public opinion with regard to the significance of insanity.

And, secondly, we must remember the importance of the environment, more especially of the human part of it. A man of sound stock is very commonly brought up as a sportsman, whose first idea is to kill; or as an idler, whose chief occupations are eating, drinking, and smoking, with travel and some amount of gambling thrown in by way of variety. Or he may easily be above all things a money-maker and a lover of money. His habits of this sort will determine to a very great extent the early—and that is the critical—environment of his children. The tendency in his family will be towards uniformity, towards one level, and that not a high level, of thought, activity, and character. His example and influence will go very far to counteract the advantages presumably ensured by the soundness of his stock.

On the other hand, a man whose ancestry is eugenically not flawless may have such wide interests, so many and such fine powers, so much skill in different activities, and so high and generous a personal ideal, that the environment which his manner of life would make for his children—the inspiration he would be to them—might well be expected very largely, if not wholly, to counteract the disadvantages of defects in the stock.

No doubt this principle should be applied with all reasonableness and care, but it is extremely important for the highest welfare, for the development of the best possibilities of the people, that it should be definitely recognised.

ANTHROPOLOGY A BRANCH OF BIOLOGY

A word must here be said as to the importance —more especially to the biological student who aims at social work—of some knowledge of Anthropology. Biology is, in fact, incomplete without anthropology; for in its absence there is a danger of applying biological principles too summarily, and therefore unscientifically, to humanity. Anthropology, of course, goes behind art and history and the literary ideas current among civilised peoples. It gives life and meaning to customs, legends, handicrafts, details of dress, ornament, and furniture which otherwise go unheeded or misunderstood. It helps to interpret for us the ways of contemporary peoples and classes which are on a level different from our own. It gives a unity in infinite diversity to our whole conception of humanity. When more widely studied, there can be little doubt that it will cause us to reconstruct many of our judgments, both concerning the history of the past and concerning the civilisations of the present day.

We cannot but believe that a time will come when it will be assumed of all women that they know the broad truths of biology, just as it is now assumed that they know the alphabet. It will be taken for granted that they have mastered the essential domestic arts with their own hands,

just as we now take for granted they can write with their own hands. We shall have reached then the beginning of a new era—an era which we may hope will unite the excellences, moral, æsthetic, and hygienic, of earlier times, with the excellences, more purely intellectual and scientific, of our own day.

WOMAN'S SYNTHETIC POWERS AS AN INSTRUMENT TO EFFICIENCY

The most effective instruments for bringing this about are the synthetic powers of woman herself, combined with her practical skill and her ready intuition. As we have tried to show, the best chance for the eliciting and the disciplining of these powers of hers, so as best to fit them for the struggle of modern life, is afforded by biology.

It must be clear how many reforms—impossible to the nominally educated women of the present day —would flow easily from this better training of women ; for those so trained could certainly not endure the futility of some of our educational ideals, nor that haphazard disregard of the nature and needs of the child, which still characterises so much of our educational method. They could not support the continuance of many of the common evils of modern life—the noise and dirt, the brutality of manners, the scamping of work, the rush for pleasure. These, however they may or may not affect the adult, are plainly impairing the best

promise of the children; and that fact will be enough for the truly educated woman.

Knowing, too, as she will, more accurately and scientifically than women to-day generally know, how largely energy and depression, irritability and calm strength are questions of right or wrong food, the educated woman may be trusted to find a means to put an end to the crying iniquity of adulteration. Directly or indirectly, by the pressure of her determination that the race shall no longer be offered a sacrifice to Mammon, she will assuredly find a way to put an end to all not absolutely necessary dangerous trades.

The opposition of such women to what is wrong in social custom, in government, in education, will be a very different thing from the opposition of well-meaning but imperfectly instructed women on the one hand; or, on the other, that of a few thoroughly trained and informed ones working more or less in isolation, scattered over the country. It would mean a body of sound, enlightened, disinterested public opinion, so vast, so far-reaching, yet so intimately cognisant of all the little daily details of life in the home, that it is difficult to see what other body of opinion could be found mighty enough to resist it.

If, unhappily, this advance should not be made —if our present Western civilisation be allowed to run unchecked down the groove into which it has sunk—there seems nothing before it but destruction.

SCIENCE IN THE HOUSEHOLD

By Mrs. W. N. SHAW

SCIENCE IN THE HOUSEHOLD

THE slow development of the demand for the training of girls of the middle and upper classes in the details of household management has been to a great extent due to the common observation that persons of imperfect education are frequently proficient in the domestic arts, and to the assumption that good housekeeping consists entirely in the efficient exercise of those arts.

The fact that in the early Victorian period girls living much at home learned, almost insensibly, from their mothers the routine of daily duties in the house, has made elder women look askance on the lectures dealing with domestic economy which appear to them so needless, and has led them to foster the superstition that woman *qua* woman should be equal to any demand that may be made upon her as organiser of her own household.

That the housekeeping of to-day is more complex than that of half a century ago is incredible to the older woman who remembers the baking and brewing, and divers other matters, that demanded the attention of the notable housewives of the forties and fifties of the nineteenth century.

That the horizon of women's lives has widened, and that other interests than those appertaining to their immediate circle claim their attention, is not acceptable to all; it is however the claims of these outside interests that have awakened in the more thoughtful the desire so to order their households that they may in some degree free themselves from petty cares, and be able to help in the amelioration of the lives of less fortunate persons; or to pursue other branches of knowledge in which they have learned to take a keen intellectual pleasure.

It is a paradox that one of the difficulties with which the modern mistress has to contend is the fact that her house is "replete with every modern convenience." Every labour-saving contrivance, every mechanical convenience, calls for vigilance to ensure its proper use, and for knowledge as to the ways in which it may fail, and of the method of readjustment if it should happen to do so. No apparatus which is not thoroughly understood by the mistress will be well used by the servants, and servants will rarely if ever exercise any knowledge they possess to prevent the expense of calling in a workman. If the mistress of a house can use such ordinary tools as a hammer, a screwdriver, a gluepot, and a soldering-iron, a great deal of expense may be saved in small repairs; on the other hand, ignorant meddling with scientific apparatus may be worse than useless. There can be no doubt that a course of instruction in natural philosophy, combined with work in

a well-equipped laboratory and workshop, should find a place in the curriculum of every girls' school, whether elementary or secondary, as this training lays the surest foundation for a superstructure of experimental domestic science. The argument against including the application of the physical sciences to domestic methods in the ordinary educational course of every girl, namely, that she may not be called upon to keep a house of her own, cannot be sustained; there are no circumstances in which knowledge of the laws which govern the health and well-being of human beings can be useless. We all live in houses, either our own or other people's, and we are all liable to disease and discomfort caused by the faulty construction of the house or the unhealthy practices of the inmates.

THE AIM AND METHODS OF MODERN EDUCATION

The aim of education is to enable a person to act wisely in every emergency of life whatever his particular calling may be, but it is hardly possible to act wisely without some knowledge of the relation between cause and effect. This is true whether we are engaged in the practical affairs of life, in the pursuit of knowledge, or in the effort to extend knowledge by research. It is sometimes argued that a woman of trained intellect can easily acquire the art of housekeeping, and this is no doubt

the case if we limit the art to the choice and supervision of competent domestics, but there can be no doubt that there are many women of trained intellect who not only suffer themselves but entail suffering on others from inability to discern good housekeeping, in our sense of the word, from bad. It must be remembered that courses of education should be framed for the training of unmethodical and unpractical minds, which may and often do accompany the highest forms of intellect, as well as for those of a naturally orderly and practical bent.

We all consciously or unconsciously make use of the facts of science: we do not send eggs by parcel post merely placed in a box, we do not even send one egg in a box that exactly fits it, we are careful to surround each egg with soft paper or some other elastic material in sufficient quantity to distribute the effects of the blows that we know the box will be subjected to in the post, so that the eggs may not be broken; if we place a tray of china on a table, we are careful that it should not project beyond the table so as to fall when we let it go; we do not pour hot water into cut-glass tumblers, and we do not mix effervescing drinks in wine-glasses. We should call a person ignorant who was unaware of the probable results of doing the things enumerated above; but if the accidents following want of knowledge were always so simple, ignorance would not be a matter of much importance, and we might be willing to let our girls learn by experience. Unfortunately, the neglect of a

scientific law has led in the past, and may lead in the future, to much more serious, even fatal results, and Solomon has applied a not very complimentary epithet to those who have wisdom forced upon them by involuntary experience. It is to the publication of statistics which show the alarming spread of such diseases as consumption and the terrible waste of infant life, that we owe the awakening of the public mind to the need for systematic training in science and scientific method.

THE VALUE OF A SCIENTIFIC TRAINING

Scientific method seeks to establish relations between isolated facts or phenomena, and the relation generally takes the form of cause and effect ; so that persons with a scientific training are accustomed to examine the grounds for considering this relation of cause and effect in circumstances which are selected with a view to exhibiting the reality of the relation. From that training it becomes possible for them, when confronted with circumstances presenting some difficulty, to form a better opinion as to what is the cause of the difficulty than they could if they were confronted with the same difficulty without the previous training. Any attentive observer of human nature will be struck by the fact that every person is accustomed to refer every event to some cause ; if it is an illness, the occasion for

contracting the illness is defined; if it is any unforeseen event in the domestic economy, a reason is nearly always forthcoming; the question which the housewife is called upon to decide is whether the reason offered is a real and sufficient one. Meteorologists tell a familiar story of an Indian nabob who found that there was a deposit of moisture on the outside of his tumbler of brandy and water, and tasting it with his finger, remarked it was very curious that the water came through the glass but the brandy did not. Plenty of reasons offered for domestic incidents have no better ground of fact than the nabob's opinion that the water came through the glass.

A good deal of the comfort of a modern house turns upon a right judgment as regards cause and effect, and therefore some preparation which will fit the housewife to appreciate the rights and wrongs of domestic reasoning is an indispensable qualification for success. It is not always possible for the most profound student to offer offhand the true explanation of various facts of domestic life, but it is possible to approach the consideration of these questions with some hope of deciding whether the explanation offered is a true or a fictitious one. The ability for this is largely a question of habit of mind or training; and for our purpose the training must include those departments of knowledge, the laws of which find daily expression in the manifold experiences of domestic life. The ultimate foundation for these laws is to be found in the study of Physics, which deals with those

changes in the state of matter which stop short of the alteration of its composition ; of Chemistry, which deals with changes involving an alteration of the composition of the substances under consideration ; and of Physiology, which is the identification of the processes which take place in living animals and plants and their relation to the laws of physics and chemistry. Without a knowledge of the fundamental principles of these sciences and of the methods by which those principles are established, it is not to be expected that any person can deal adequately with the common experiences of life.

It is true that experience, if it is sufficiently extensive and prolonged, may lead to the formulation of a set of practical rules that will carry a housewife through the ordinary household round without discredit, but the question which we have to put to ourselves is whether, by organising and directing the experience, success may not be made certain and more instructive. In these days domestic life is more complicated than it used to be; at the same time experience is in a sense more restricted. Many of the instructive processes, practical experience in which conveyed valuable if unconscious scientific training, are now conducted on a large scale, and are outside the range of domestic duties, and the housewife has to supply, by special training in scientific principles, the judgment that in days gone by was acquired as a matter of habit.

It is impossible in the short space of a

single article to set out the details of a systematic course of training sufficient to fit the housewife to use her judgment wisely in circumstances which require a knowledge of the principles of the fundamental physical sciences. The most that we can attempt is to give a few examples which illustrate the application of the principles of physics and chemistry. Our purpose in doing so is to suggest illustrations which appeal to every householder, and may create a desire for fuller knowledge rather than to supply a course of instruction. What we aim at is not to provide the equipment of scientific training, but to show that the scientific habit of mind will find opportunities for useful employment in many of the most ordinary affairs of life. The problems that present themselves in the course of experience are sometimes difficult and intricate; patience and careful observation as well as knowledge are required for their solution. Sometimes this solution is beyond the immediate resources of those concerned, and it is a part of scientific training to recognise when this is the case, so that effort and money may not be wasted in endeavours which are foredoomed to failure. We may cite a case in point where an extra bell was desired in a system of electric bells in a flat at a time when electric installations in private houses were somewhat rare, and workmen with any knowledge beyond that necessary for carrying out instructions were not easily found. To the confusion of the tenant, the introduction of this extra bell caused all the bells in the flat to strike

work. A mathematical lecturer living in the same building was consulted, and opined that the battery of two somewhat small-looking cells was insufficient, so he obtained and added a larger cell, but the bells were obdurate and did not resume work. A lady with knowledge of physics examined the installations and discovered that the wire connections as altered were entirely wrong and did not connect the bells to the battery. A plan of the correct connections was shown to the workman, who a few days later reported that now all the bells rang at once, and he had had to disconnect the battery! He produced a sketch of the connections he had made, and on his error being pointed out he was able to rectify it, and the bells answered to touch without the use of the extra cell. Generally speaking, a failure on the part of electric bells is corrected by filling up the cells which compose the battery with water, an operation which any one may undertake.

It is not safe, however, for an inexperienced person to interfere with electric light fittings further than to remove a worn-out lamp and place a new one in the socket, and even this operation may be attended with disaster. A young friend of ours who was taking part in some private theatricals obtained the loan of a row of electric footlights. It did not occur to any one concerned to ask the voltage of the lamps or of the current to which they were to be applied. When the footlights were turned up they blazed for a brief period, and then every light in the house went

out! Electrical science for the housewife has been resolved into a knowledge of electric terms and of a few practical rules useful and interesting in themselves, but not immediately suitable for our purpose of showing how scientific study may aid the housewife in her daily routine.

PHYSICAL SCIENCE IN THE HOUSEHOLD

We may for this purpose examine some of the laws of common physical and chemical phenomena, neglect of which has resulted in much needless discomfort in daily life, and even more serious consequences. For instance, the laws of expansion of gases and liquids with heat, and their subsequent behaviour, are phenomena that are often imperfectly realised. There is probably no person who is unacquainted with the law of gravitation, but there are many persons who accept literally the statements that smoke rises and that balloons ascend. A clear understanding of what actually takes place when gases and material masses appear to move in opposition to the law of gravitation is essential to any scheme for warming and ventilating the house.

A very simple experiment will serve to reconcile the apparent contradiction of the universal law by the observed fact. Suppose we have two fluids, oil and water, of which oil is, bulk for bulk, lighter than water. If the oil be poured into a glass beaker, it will be seen to rest at the bottom of the beaker; if water be now poured into the same

beaker the water will go to the bottom of the beaker and will displace the oil and lift it up so that the oil will float on the water ; the oil may be lifted to any height we please if sufficient water be poured in to lift it to that height. If a single drop of oil be introduced into the water by means of a pipette and be liberated at the bottom of the beaker the water will close in under it, and lift it up to the surface. In both cases the oil "rises" through the water. Oil, however, has no tendency to "rise" by itself, and in this case it lay motionless until it was lifted by the heavier fluid. We may use colloquial language when describing phenomena if we bear in mind what is really taking place.

A balloon "rising" through the air is exactly analogous to the drop of oil in the water. The balloon is, bulk for bulk, lighter than air ; the air therefore closes in under it and lifts it just as the water lifted the bubble of oil.

EFFECTS OF CHANGES OF TEMPERATURE ON AIR

Let us apply this to air. Air when warmed expands, and therefore warm air is, bulk for bulk, lighter than cold air. Warm air behaves in the presence of cold air as the balloon : it is displaced and lifted by the cold air, the result being an ascending stream of warm air, which is called a convection current.

The movement of ascending smoke is essentially

the same as that of the warmed air. Smoke is warm air made visible by the particles of soot with which it is laden. The particles of soot would fall to the ground except that they are carried upwards in the stream of warm air. Dr. W. N. Shaw has called attention to the importance of these phenomena in his book on "Air Currents and the Laws of Ventilation," in the Cambridge Series of Physical Text-books. He there says: "The dominant physical law in the ventilated space is the law of convection. It is at once the condition of success and the cause of most failures. Without convection, ventilation would be impossible; in consequence of convection, nearly all schemes of ventilation fail.

"The law of convection is the law according to which warmed air rises and cooled air sinks in the surrounding air. Its applications are truly ubiquitous. Every surface, *e.g.* a warm wall, or a person warmer than the air in the immediate neighbourhood, causes an upward current; every surface colder than the air in contact with it causes a downward current.

"Ventilation would be much easier if warmed air or cooled air could be carried along at any height required; but the law of convection is inexorable: warmed air naturally finds the ceiling, cooled air the floor."

It is true that the ventilation of a house is generally considered to be the business of the builder and architect, yet there are many unpleasant phenomena that come under the observa-

tion of the housewife which are due to this law of convection, and it will be useful to consider a few of them.

Let us take first the universal annoyance to housewives caused by the sight of *dirt on the ceiling*. That all air is full of dust is seen when a stream of sunlight crosses a room ; the particles of dust are then clearly perceived moving rapidly in all directions in the air. These dust particles, when air is at rest, constantly fall to the ground under the action of gravity, and are deposited on shelves and ledges, from which they have to be removed daily by the housemaid. When air is warmed and ascends it carries the dust particles with it, and these particles striking against any cold surface with which they come into contact stick to it. This is the cause of the necessity for the periodical sweeping of chimneys. The walls of the chimney are colder than the smoke that comes into contact with them, and the particles of soot in the smoke striking against them are deposited on them. In the house the effect of the bombardment of surfaces by dust-laden streams of air is seen most conspicuously over burning gas-lights. Burning gas does not itself produce all the dirt which is found on the ceiling above it, but it causes upward streams of hot air, which carry up the dust and deposit it on the ceiling. The practice of suspending a shade over the gas-light does not lessen the amount of dust and smoke in the air, but the shade serves to spread out the air over a larger surface, and thus to render the dirt on the ceiling less apparent.

That the shade itself remains clean is due to the fact that it gets hot. A heated surface promotes the activity of the motion of the air-particles in its neighbourhood, and by this local activity the dust is repelled, so that a surface remains clean or becomes coated according as it is more or less hot than the invading current. The validity of this explanation may be tested by holding a cold spoon over a lighted candle when it will be seen that the spoon becomes blackened; if a hot spoon be substituted for the cold one it will remain clean.

In order that the hot, vitiated air of a room may escape easily, it has been in many cases the custom to place an exit opening for it in the chimney over the room fireplace. The wall in the neighbourhood of this ventilator invariably becomes black; but as this wall is warm it is not probable that dust is deposited on it by the outgoing air, the explanation given by the housewife that the smoke from the chimney gets through the ventilator into the room is probably correct, though these ventilators are supplied with mica flaps which should swing open when air from the room strikes against them, and close when the air from the chimney does so.

When a house is heated by hot-water pipes and radiators, the walls over these pipes are another source of trouble (Fig. 1). A good deal of scientific ingenuity is required if the walls are to be kept clean.

That some ceilings appear striped with broad

light and dark lines is due to inequalities in the temperature of the ceiling. The light stripes are under the joists, which prevent to some extent

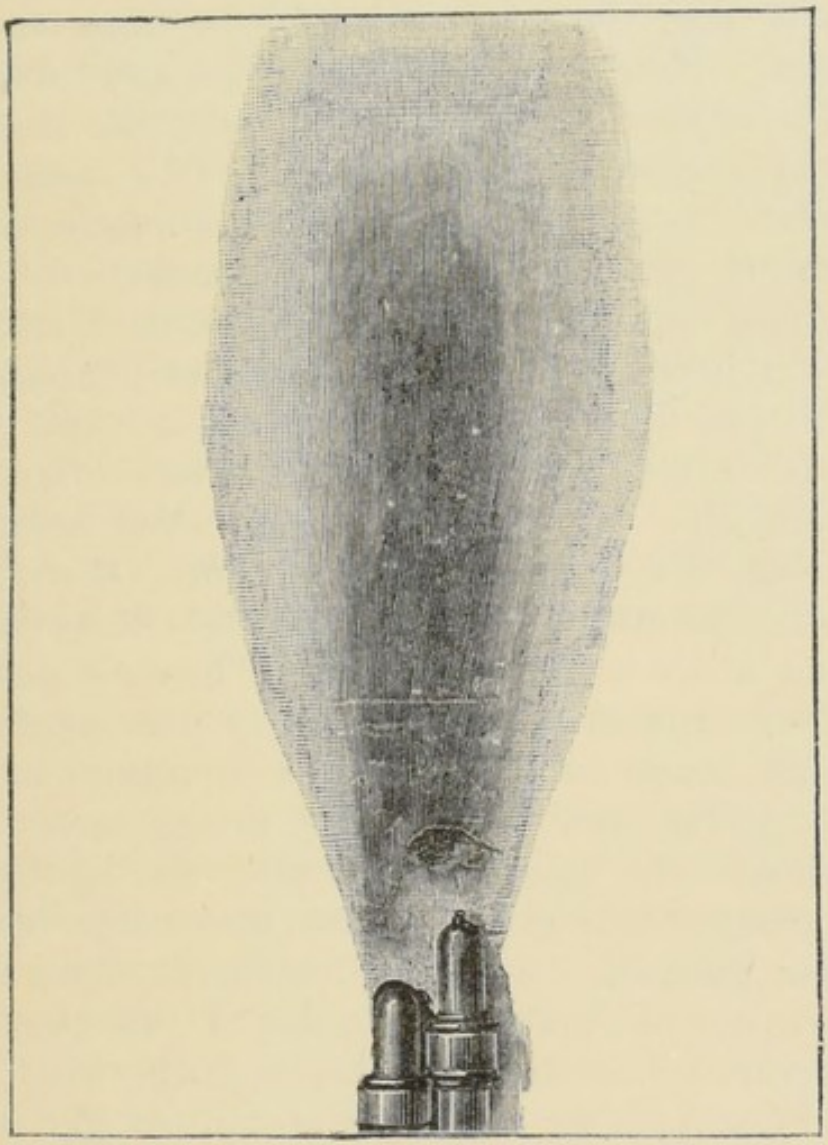

FIG. 1.

the escape of heat from the ceiling, and the dark correspond to the unprotected parts of the ceiling. The dust rising from the room is slightly repelled

by the currents from the warmer parts of the ceiling, and sticks more readily to the colder parts.

Let us take for our second example the apparently trivial matter of *smells in the house*. Smells may be of various kinds from various causes. The best judge of the kind, and therefore of the cause, is the nose. Suppose the smell to be the common one in houses of all classes—the smell of cookery! The smell of cookery in the house is generally a winter phenomenon. The air in an inhabited house is always in a state of motion, induced by the inequalities of temperature caused by the inhabitants themselves, and to a greater extent by the fires, of which there will certainly be one in the kitchen. We must remember that cold air will get into the house through all available openings, to take the place of the air which supplies the fires. The most obvious available openings in an ordinary dwelling-house are the casual ones of the open chimneys of unused grates, and the loosely fitting doors and windows. In cold weather fires are lighted in the sitting-room grates; these fires when lighted should warm the air in the chimneys above them and cause an upward draught in the chimney. Sometimes however the chimney will be found to be occupied by a current of air coming down to feed fires in other rooms, and so long as this goes on the smoke from the newly lighted fire comes into the room. The down-draught can be stopped by opening a window to supply sufficient cold air to counteract it, otherwise we

have to adopt special devices to make the smoke go up the chimney in the first instance. Sometimes a newspaper is burnt in the grate to give the necessary amount of warm air, but this is a dangerous practice by which the chimney may be set on fire. Sometimes air is supplied by the bellows. A newspaper is often held in front of the grate so as to close the opening above the fire and cause the cold air to pass through the fire, thus promoting combustion and the supply of hot air in the chimney. In any case, the warm air of the fire is carried up the chimney by the cold air of the room, and this cold air is drawn from the casual openings already referred to. It has been demonstrated by laboratory experiments that the amount of draught in any chimney depends on the height of the chimney and the fire in its grate.

Smells are conveyed about a house by the flow of air to feed the fires, and they nearly always find their way from all parts of the house to the ground-floor sitting-rooms when the doors are left open and the fires are burning. On their way they pass through passages and are therefore nearly ubiquitous. The air of any room in the house is in communication with that of every other room, and it is only by the nature of the smell that we can tell its probable source. There are people who like when they open the bedroom door in the morning to know that coffee and bacon await them downstairs, or on coming into the house from a cold winter's walk to meet a "delicious

smell of Irish stew." To other people all smell of cookery is abhorrent, and they feel a sense of irritation that their guests should on entering the house be regaled with the odour of the preparation of food. To many mistresses the only remedy that suggests itself is a message to the cook, who is powerless in the matter and returns an answer that she is sorry, but that she doesn't know why there should be a smell of cooking upstairs as there is none in the kitchen. A visit to the kitchen will generally confirm the cook's statement as to that particular spot, but a considerable smell will be encountered on the kitchen stairs. We may inquire into the cause of this. The usual equipment of the kitchen includes a closed range, supplemented in many cases by a gas stove. The kitchen fire draws a plentiful supply of air from casual openings, and this air for the most part passes with the smoke up such flues as are open. The oven is provided with a ventilator, which carries off the odour of baked or roasted meats. The odour in the hot air over the closed range has no escape except into the kitchen—the cook says that ever so slight an opening in the top of the range will prevent the oven from heating. This odour-laden air therefore comes directly into the kitchen, and being hot is directed to the ceiling, thus escaping the cook who is in the draught of the fresh air supply. Travelling along the ceiling the hot air passes through the opening at the top of the door and mingles with the fresh air on its way upstairs. The same thing happens when the

gas stove is in use. The only remedy is to provide some exit for the hot air of the kitchen which will be more easily accessible than that by way of the door, for the hot air will travel by the easiest path. A considerable knowledge of science is required to achieve this object.

Closely allied with the smell of cookery is *the smell of the gas stove*. Many persons consider that the use of a gas stove either in the kitchen or in a bedroom is inseparable from the peculiar odour of partially consumed gas. It may therefore be useful to consider how the gas supplied to stoves and incandescent lights differs from that of an open gas fire or that of an ordinary burner. Gas stoves and incandescent lights get their supply of gas through what are known as Bunsen burners, so called after the German chemist whose invention they are. In an ordinary burner the gas mixes with atmospheric air at the opening at which it burns; the supply of air obtained in this way is insufficient for complete combustion until the outer layers are reached; the interior part of the flame is bright and smoky. In the Bunsen burner the gas issues from the main through a nozzle which opens inside a bulb. The bulb is perforated to allow of the ingress of atmospheric air; the gas and air mix in the tube which is a prolongation of the bulb, and the mixture is lighted at the top of the tube. Fig. 2 shows a representation of the Bunsen burner as applied to a gas stove. In this the gas escapes from the main at the nozzle *n*, into a bulb of which the tube A is a prolonga-

tion, air is admitted to the bulb at the openings *a a*, and the mixed gas and air is burnt at the openings in the tube A. The amount of air supplied is regulated by the size of the openings *a a* and the holes where the gas is lighted. The gas thus supplied with air is completely consumed where combustion begins, and a clear, blue, non-luminous flame is the result. If the holes through which the mixture of gas and air issues are partially closed by rust or by accretions from the "boiling

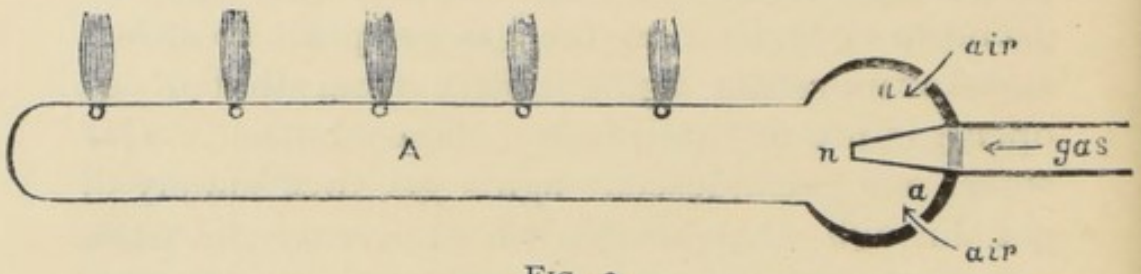

FIG. 2.

over" of saucepans it is evident that, the gas supply being unchanged, less air can be drawn through them; consequently the gas will not be entirely consumed, and acetylene (C_2H_2, one of the products of partially consumed coal gas) will pass into the atmosphere and will give rise to the peculiar odour associated with gas stoves. This product of partially consumed gas is very poisonous, and all gas stoves should be furnished with chimneys to carry off the fumes to the open air. The phenomenon known as "burning back," that is, the ignition of the gas at the nozzle in the bulb, is caused by the pressure of gas being too small for the supply of air. The gas should at once be

turned out and relighted till it burns at the proper places. The simple remedy for smell from a gas stove is the cleansing of its burners, unless indeed the kettle is too close to the holes from which the gas issues for complete combustion to be possible.

There is another winter phenomenon which is very disagreeable—the presence of *fog in the house;* and the perplexed housewife asks, Where does the fog get in when all outside doors and windows are closed? We have already pointed out that the sitting-room fires must have air, and that that air will be drawn from casual openings. Among these openings are the chimneys of fireless grates; the greater part of the fog in the house comes down these chimneys. On a foggy day it is wise to close the chimneys of fireless grates and provide some other opening for the supply of air; but all air from the outside is full of fog. The problem of how to let in air and keep out fog suggests the question, What is fog? Fog consists of material particles (dust or smoke) on which vapour has condensed; if these particles can be removed the air will be clear. The problem for the housewife is how to free a sufficient quantity of air from these particles.

A smell of gas in any part of the house may be very dangerous if no one on the premises has any scientific knowledge, for it may be premised that the escape of gas is not where the smell is first perceived. Gas being lighter than air is carried upwards, and the smell is at first above the place of escape; it may even be in a room over where

the gas is escaping. The only safe detector of the source of mischief is the nose; the mixture of coal gas and atmospheric air is explosive, and no light must be struck. The upper sash of the window should be pulled down to allow the gas to escape, and if the accident is at night time must be allowed before searching for the source of escape further than can be done by feeling the taps in the dark or following the scent by the nose.

Further illustration of the effect of convection currents in the air of a dwelling-house are needless, but the student may profitably spend time and thought in considering how fresh air may be introduced into a room without causing cold air to lie on the floor or hot, vitiated air to cling to the ceiling. It is the old problem (with a difference) of teaching a grandmother to suck an egg. He may also interest himself in seeking answers to the questions (1) What action is expected to take place when a poker is placed against the bars of a grate to make the fire draw? and (2) Does the sun put the fire out, and if so how? In connection with the expansion of air with heat he may consider the popular fallacy that an inverted empty pot in a pie keeps in the juice.

EFFECT OF CHANGES OF TEMPERATURE ON WATER

Accidents have occurred in houses owing to ignorance of the full effects of heating or cooling water from its ordinary temperature. Water at

any ordinary temperature expands when subjected to the action of heat ; it contracts on cooling till it reaches a temperature seven degrees above the freezing point; from this temperature it expands until it becomes a solid mass of ice. At still lower temperatures ice contracts.

Let us consider first the effect of heating water. If water at the ordinary temperature be poured into a vessel which is placed on a fire or other source of heat the water at the bottom of the vessel will be warmed and will expand ; it will therefore be lighter, bulk for bulk, than the water nearer the top of the vessel. The cold water will therefore descend, and the warm water will rise. All ordinary water contains air ; presently the air in the water will become visible as small bubbles which rise to the surface of the water and escape noiselessly into the atmosphere. As more heat is applied some of the water in the bottom of the vessel will be formed into steam, and bubbles of steam will expand and rise into the cooler water above and collapse there with a rattling noise which is characteristic of the state known as simmering. These bubbles of steam rising and bursting aid the convection currents in stirring and mixing the water so that it presently becomes of even temperature throughout. When this occurs the bubbles of steam rise to the surface and burst explosively into the atmosphere, throwing the water violently about ; the water is then boiling. It is an important point to remember in cookery that boiling water will not

become any hotter with the application of more heat, but it will "boil away;" that is, it will be completely converted into steam. The steam resulting from any volume of water occupies a space 1700 times that of the water from which it is produced, but what concerns the housewife most seriously is that the change of water into steam is accompanied with the evolution of tremendous mechanical force that will burst any vessel in which the water is enclosed. It is the fact of this tremendous exercise of mechanical force that has led to serious accidents when hot-water bottles have been put into the oven to keep warm. It has been assumed by some people that if the hot-water bottle be not completely filled, that if what they consider to be sufficient room is left for the expansion of the water, no harm can result from putting the bottle into the oven, but no arrangement can make such a course safe.

The bursting of the kitchen boiler is an accident resulting from disregard of the phenomena of heated water. It sometimes happens that the hot-water supply of the various taps in the house fails. If the boiler supplying the water is a hand-fed one some one whose duty it was to fill it has neglected that duty. An empty boiler with a removable lid will do no harm, but it is not advisable to leave it empty, as the heat of the fire will destroy the iron of which it is made. No attempt, however, should be made to fill the boiler while it is hot, as the result of pouring cold water into it will be the sudden and violent conversion of the

water into steam, and the person pouring in the water will assuredly be scalded. If the boiler be one that is filled automatically, one of two things has probably occurred: either the pipes are blocked by fur—that is to say by sediment from the boiled water—or the supply-pipe is frozen. In neither case is it safe to light the fire. If the pipes are blocked by fur steam will be formed in the boiler and it will burst; if the supply-pipe is frozen the heat may thaw the ice, and the inrush of cold water will at any rate crack the boiler.

When water expands with heating convection currents are formed in it, and the hot water rises to any height we please if cold water be available to take its place. This law of convection is applied to maintain a circulation of hot water in pipes used for warming a house. The general arrangement of such a system is shown in Fig. 3. The furnace heats a boiler in the basement or on the lowest storey of the house; HB and HL′ are parallel vertical pipes connected with a horizontal pipe H′H at the top of the house; C is a small cold-water cistern which is furnished with a ball-tap to maintain the supply of cold water to the pipe H′L if any water is drawn off at any part of the circuit. The short pipe A acts as a valve for the escape of air from the pipes. The pipes H′L, H′H, and HB are filled with water. When the fire is lighted in the furnace, hot water is driven up the pipe HB by cold water descending through H′L, and this circulation goes on so long as a

difference of temperature is maintained in the pipes; that is, so long as the fire is burning. Any number of coils of pipes may be introduced into the circuit between the boiler and the top of the pipe HB. In filling the pipes with water allow-

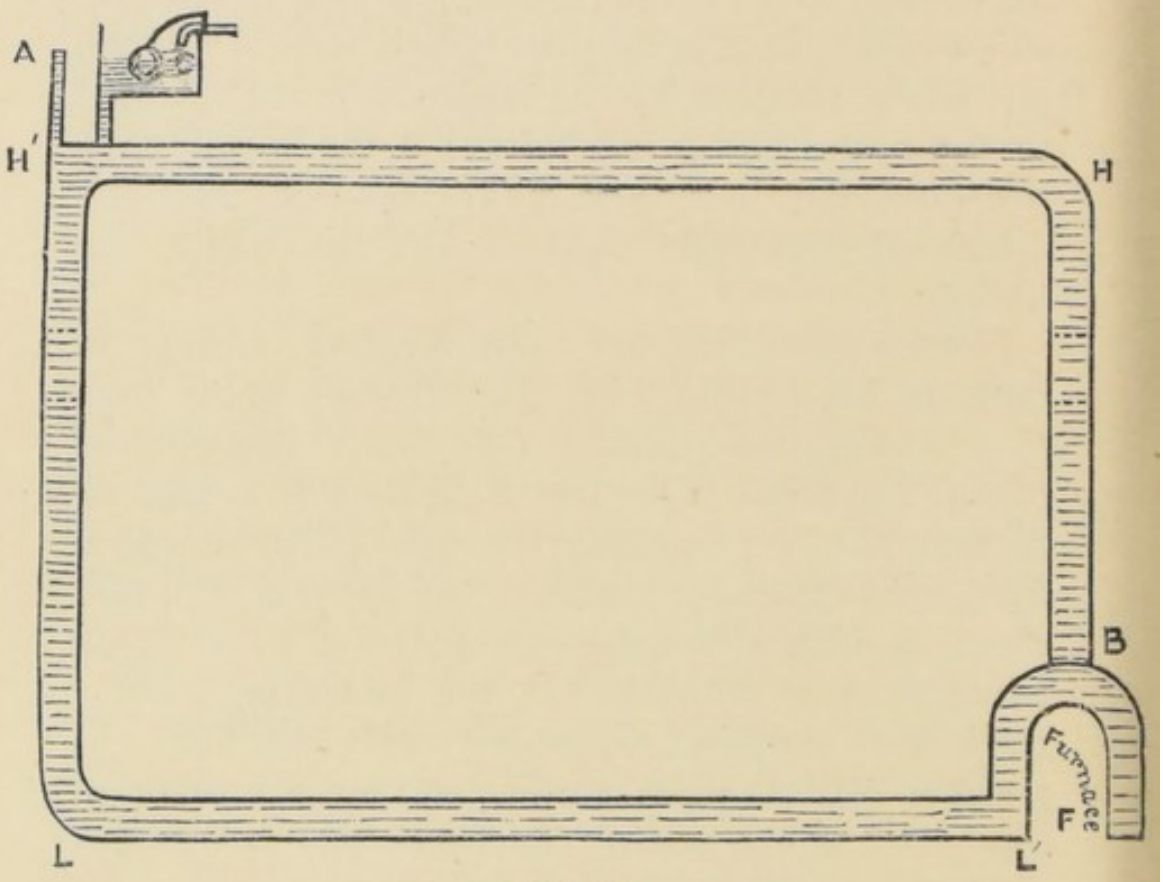

FIG. 3.

ance is made in these coils for the expansion of the water with heat and for the air which we have seen escapes from heated water, and a tap is fixed in each coil for letting out any air that may have lodged in it. If free air remains in the pipes the circulation of the water will be hindered and the boiler may become dangerously overheated,

It is therefore necessary when the heating apparatus is in use to examine these taps and see that water and not air escapes from them.

The installation of a heating apparatus in middle-class houses is fairly common, and where one is not found many persons use gas or oil stoves in the passages in the winter, for it is now realised that it is not possible to heat rooms by means of open fires without creating cold draughts in them from the cold passages into which they open. And, moreover, the constant change of temperature encountered in passing from one warm room to another through cold passages is not only disagreeable, but is not found to be conducive to health.

Let us turn to the cooling of water. Water expands about one-eleventh of its volume on becoming ice. This change of state, like that of change into steam, is accompanied by the evolution of tremendous mechanical force. If water freezes in pipes it bursts the pipes, and on a thaw taking place the pipes are found to leak. The appropriate remedy for this state of things is to protect the pipes from cold or to empty them when a frost is apprehended. In all properly built houses there is a tap by means of which the water supply can be cut off from the house, thus allowing the pipes to be emptied on a frosty night. The custom of leaving the taps dripping is effective, because the pipe is generally liable to freeze at some particular point where it is in immediate contact with the cold air, probably in the unclosed

chink where the pipe passes through the wall; keeping the water moving in the pipe prevents any part of it getting cold enough to freeze, but the practice should not be resorted to, as it wastes water.

RADIANT HEAT

It is pleasant on a dry, still day in winter, when the ground is covered with crisp snow or glistens with hard frost, to feel the warmth of the sun's rays, and it is becoming quite a fashion for people of leisure to spend the winter months at the pleasure resorts amid the snow-laden mountains of Switzerland. It is a matter of some interest to inquire how it happens that the sun's rays are warm when the thermometer tells us that the temperature of the air is below freezing-point. There is an old and pretty experiment in which a burning glass is made of ice; it is not a difficult thing to do. If the scale-pan of an ordinary balance be made hot and be pressed against a slice of ice (the concave side of the scale-pan towards the ice), first on one side of the slice and then on the other, the ice can be formed into a convex lens (Fig. 4). If now this lens be placed in the path of a sunbeam and the light be brought to a focus, that is, to a bright spot on a piece of paper, the paper will be heated and will take fire while the lens through which the heat passes remains

FIG. 4.—Section of a Convex lens.

ice. From this we may surmise that the heat of the sun does not affect the medium through which it passes.

Clerk Maxwell suggested yet another experiment in illustration of this law. By means of an ice lens he collected the sunlight to a focus in the middle of a basin of clear water, and observed that no effect was discernible in the water. He then directed the focus (the spot of light) on to a mote in the water. The mote became hot, the water was agitated, convection currents were formed, and the mote was carried up in them. This showed that rays of light from the sun do not affect the substances through which they can pass, and that they heat bodies through which they do not pass. It has been demonstrated by laboratory experiments that all hot bodies emit rays of heat, whether we see the rays or not. When we see the rays the bodies are said to be red or white-hot. The process by which heat passes from one body to another without warming the intervening medium is called radiation. Radiation takes place only through transparent bodies. Rays of heat, like rays of light, pass through transparent bodies ; whereas they are absorbed by, that is they make hot, opaque bodies. Heat rays travel in straight lines and are reflected from polished surfaces ; their intensity varies inversely as the square of the distance of the object on which they fall from their source. The heat of an ordinary fire is radiant heat ; when we sit round the fire we act as opaque bodies and absorb the heat, and

are what we call scorched if the fire is very bright. If we move away from the fire, still letting the same firelight shine on us, we are not scorched ; this is because the heating power of the rays varies inversely as the distance from their source, therefore if we move away double the distance we receive one quarter of the heat that we received before we moved. If we draw our chairs to one side we are not scorched, because the rays of heat do not travel round a corner.

CONDUCTION OF HEAT

We have seen that the ice-lens was not affected by the passage of heat through it. If we now take hold of the lens we shall experience a feeling of cold, and the lens will begin to melt. Heat has passed from our hand into the ice. The process by which heat passes from one body to another in contact with it is called conduction. The fundamental law of conduction is, that heat always passes from a warm body to a cold one. Clerk Maxwell illustrated this law in a series of very simple experiments. He placed a silver teaspoon in a cup of hot tea, and noted that the handle became warm gradually from the hot tea ; the heat passed from the bowl of the spoon in the tea to successive parts of the handle until the whole spoon was hot. His second experiment was to put two cold spoons, one of silver and one of German silver, into the tea, when he found that the same phenomenon took place, but that the silver

spoon became hot much more quickly than did the German silver one. He then put three spoons into the tea, made respectively of silver, of German silver, and of bone. In the result, he found that when the other two were hot, the bone spoon hardly showed any sign of heat at the end of its handle.

The conclusion to be drawn from these experiments is that heat passes at different rates through different substances. Substances through which heat passes quickly are called good conductors of heat. The law of the conductivity of heat is that in a homogeneous body the flow is continuous, and is from the region of high temperature to the region of low temperature, and that it continues until the body is of uniform temperature throughout. The law is the same for bodies of different materials when in contact one with another.

The conduction of heat is in operation in every department of domestic life. People live in houses and are clothed to protect them from the vicissitudes of the weather, including the cold of winter and the heat of summer; use is made of the phenomenon in warming the house and in the preparation of food.

In selecting materials for various purposes, account has to be taken of their conductivities, for in some cases it is desirable that the transfer of heat should take place slowly, and in others that it should take place quickly. It might be thought that the conductivity of a substance could

be estimated by touch, but a little reflection will show that this cannot be the case. The flow of heat between two bodies depends upon the difference of temperature between them, and if there should be no difference of temperature between them at the moment of touch there will be no flow of heat, though both are bodies of greater or less conductivity. Let us take, for example of the uncertainty of estimation by touch, a well-known experiment. Suppose we have a basin of hot water and a basin of cold water, and place a hand in each for a few moments ; suppose we withdraw the hands and plunge them into a basin of tepid water, we shall find that the tepid water feels cold to the hand that was in the hot water and warm to the hand that was in the cold water.

Luckily, it has been found possible in the laboratory to refer substances to a common standard and to assign numerical values to them in order of their conductivities, so that substances can be compared and a selection made for any desired purpose. Pure silver has the highest conductivity; other useful materials take the following order: copper, zinc, lead, iron, steel, marble, glass, brick, slate, wood, fur, cotton, flannel, water, air. Fur and wool no doubt owe much of their warmth to the fact that they consist of fibres which enclose a good deal of air, but as a matter of fact the warmth of loosely woven woollen and knitted articles in general is often overrated; they are very warm as under garments or in calm

weather, but in windy weather the air in them is rapidly changed and the cold seems to blow through them. If for any purpose we select a material from its place in a table of comparative conductivities, and use it without reference to the law of conduction of heat, we shall probably be disappointed with the result. We know that cotton burns easily ; if we stretch a cotton handkerchief over the back of a gold watch and place a red-hot cinder from the fire on the handkerchief on the watch, the handkerchief will not be burnt.

Many interesting problems present themselves when a house has to be built or rented. There is often opportunity for some choice of material in walls or roof, and some peculiarities to be considered. Are the top rooms of a thatched cottage warmer or colder than the top rooms of a house covered with slates? Is a wooden or an iron building warmer? What difference does it make if the iron building is lined with wood? If the iron walls were twice as thick, what would be the effect inside the room? Would the walls of such a building be always dry inside? It sometimes happens that the end wall of a row of houses is covered with slates to preserve it from the effects of storms of wind and rain ; will that inside wall be always dry?

But the housewife is probably more interested in those articles in use in the house which it is her business to provide. Shall the stoves be of slate or iron? In olden days warming-pans were made of copper. What change in the manner of

use justifies making them of earthenware or India-rubber? The slow transmission of heat through thick woollen materials has been applied to the construction of Norwegian cooking-stoves (Fig. 5).

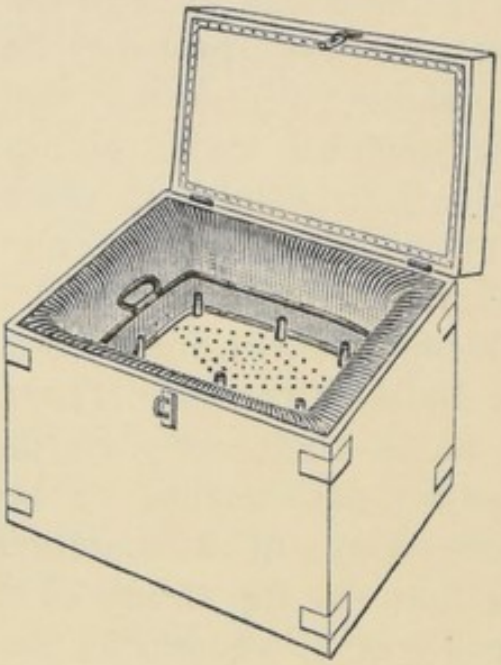

FIG. 5.

These stoves consist of a wooden box, lined with well-padded felt. The cooking vessels are of metal; the food when at boiling point is placed in these vessels and the lids put on, a thick padded felt is placed on the vessels and entirely fills the wooden lid of the box which is then closed; the heat is preserved so that the cooking is continued without further attention. Would it be possible to use the Norwegian stove as a refrigerator? Would it keep an ice pudding cold without any alteration? In connection with this we may ask why freezing machines have the inner vessel in which the freezing takes place of zinc, and the outer vessel which contains the ice and salt of wood? What would be the effect of interchanging the materials?

It is possible that the excellence of some continental cookery is due to the extensive use on the continent of earthenware cooking utensils through which heat passes very slowly. The growing

fashion of using enamelled cooking vessels must have some effect on the food cooked in them as heat certainly passes quickly through them. Reference has been made to them simply to demonstrate the universality of the application of physical laws, and we may now return to the house and its arrangement for the comfort of the inmates.

METHODS OF DOMESTIC HEATING

The two methods of warming a house are by radiation and conduction. We may surmise that in any case both methods will be in use, but the one will predominate; for instance, in heating by an open fire radiation will predominate, and in heating by stoves and radiators conduction will predominate. In planning a house a decision must be made between the two. This decision being made there is the further consideration of where the source of heat shall be placed. In the case of an open fireplace shall it be in an end wall, in a corner, in an outside wall, and so on, the object being to make the greatest possible use of the heat that passes up the chimney and of that which radiates into the room. The same consideration must be paid to the situation of the closed stove; where will it pass heat by conduction to the greatest volume of air, and where can its radiant heat be utilised?

In a room heated by a stove there is frequently a vessel of water placed by or on the top of the stove. If we ask what is the purpose of this

water we shall be told that the stove dries the air in the room. Now, it is impossible that the heat of the stove should remove any moisture from the air; we must therefore seek an answer to the question, What is dry air? The sensation of the dryness or moisture of the air does not depend only upon the amount of vapour in the air but upon the ratio of the amount present to the amount that the air is able to hold at the given temperature. The warmer the air is the more vapour it can hold, hence when the air is warmed the percentage of water present to the possible amount in it is lowered; that is its humidity, which is the percentage amount, is lowered, and we feel it to be dry. The question may arise why we should feel this when the room is heated by a stove and not when it is heated by an open fire? It may be that in a room with an open fire we are warmed by radiation and give out heat to the surrounding air which is constantly changed by convection currents, so that the air we breathe is colder than we ourselves; and that in a room warmed by a stove we receive heat from the air and are constantly breathing air that is warmer than we ourselves. But it is more than probable that the custom of providing a source of moisture to the air persists from the suggestion of a single person in seeking to relieve the disagreeable feeling attending the breathing of air laden with the poisonous products of half-consumed gas, and that it has no real scientific foundation.

How to estimate temperatures.—Whatever method

is adopted for warming a room, the housewife may be assured that the resulting temperature will not be pleasing to every member of the family. One will find it too warm, and another will at the same time find it too cold, and this not from any wilful captiousness but from the cause that we have already alluded to, that the feelings are a very uncertain test of temperature. It is therefore advisable to keep the air of the room as far as possible at a standard temperature. To do this it will be necessary to have a thermometer in the room, and to know what its readings indicate. When the thermometer registers 32° Fahr. or less, water will freeze in the room, and the vessels in which it is kept will burst ; it is therefore wise, when it is anticipated that the temperature will fall below 32° Fahr., to empty the ewers and bottles that may be in the room. From 32° Fahr. to 40° Fahr. the room will be very cold, up to and including 58° Fahr. it will be too cold to be pleasant ; the standard temperature may be taken as between 62° and 64° Fahr.

It may appear a simple matter to hang up a thermometer and read it, but a little thought will show that it is not so easy as it seems. If, for instance, the thermometer is placed in front of the fire at a distance,, say of four feet from it, what will its reading indicate ? Will it be the temperature of the air of the room or the temperature of the fire, or if neither, what will it be ? Suppose we have two identical thermometers, and hang them on adjacent walls, one of which is an outside wall,

which of the two readings shall we take as that of the temperature of the room? It is not an easy matter to decide. In a sick-room, where one person's comfort only has to be considered the doctor will order the thermometer to be hung at the bed-head, but we cannot adopt this plan in a general sitting-room.

CHEMICAL SCIENCE IN THE HOUSEHOLD

In our endeavour to establish the claims of the science of chemistry to a prominent place in the educational equipment of women, all reference to those most interesting and important chemical phenomena that accompany the exercise of the physiological functions will be omitted; as also those which are most immediately concerned with the preparation of food. Attention will be confined to some of the common occurrences of daily life, the methods of dealing with which are typical of the method adopted in considering more important and abstruse problems.

Perhaps one of the most disappointing experiences of the novice in housekeeping is the rapidity with which everything assumes a shabby aspect. Bright paint grows dull, dull paint wears away, curtains and fabrics fade, and very soon mistress and maids alike feel that the house no longer repays the trouble incurred in the spring-cleaning that it must still undergo. This spring-cleaning, the primary object of which is the preservation of the beauty and substance of the

house and its appointments, is in the result the cause of much of their deterioration.

Cleaning consists in removing dirt by means that are partly physical and partly chemical ; for instance, the removal of dust by sweeping, shaking, or brushing is a physical operation, and the removal of dirt and grease by dissolving them in soapy water involves their change by a chemical process. If the surfaces or materials to be cleaned include a substance on which the cleansing agent can operate the agent will not confine its work to the removal of the dirt only ; in washing coloured fabrics we know how often the colour comes out with the dirt. Knowledge therefore, not only of the composition and properties of cleansing agents, but also of the surfaces and materials to which they are to be applied, is essential, and we should find that it is not always the powder or paste which makes the greatest show of cleanliness in the shortest time, with least expenditure of labour, that is the most to be desired.

The use of alkalies.—The most common cleansing agents are hot water, soap, and soda. Hot water is itself a detergent ; that is, it has the power of dissolving dirt. It does not, however, dissolve grease, and all household dirt is more or less greasy, hence we cannot do our cleansing with water only, and we are accustomed to add to it soap or soda.

It is not easy or even possible to discuss the chemical properties of substances without the use

of chemical terms. Substances are classified for chemical purposes in groups, every member of which exhibits the same chemical property, and we shall require to distinguish between the group called acids and the group called alkalies. It will be sufficient for our purpose just now to know that acids have a sour taste and that alkalies counteract acids. From this definition lemon-juice will easily be recognised as an acid. If we add soda to lemon-juice there will be a brisk effervescence and the lemon-juice will no longer be sour, hence soda is an alkali. Alkalies have another well-known chemical property—they dissolve grease and oil and enable them to mix with water. If we have some hot water in a tumbler and pour oil into it the oil will float on the water, and if we stir the two together the oil will break into globules but will still float on the water ; we cannot mix them together. If we dissolve some soda in hot water and pour in oil we shall find on stirring that the mixture becomes milky or soapy in appearance and the oil and water are no longer discernible as different fluids. Moreover, on standing the oil will not again separate from the water ; it has been emulsified. Oils themselves have the chemical power of dissolving resins. Resins are hard, bright vegetable gums which will come under our notice when we consider the composition of varnishes.

All hard soaps are made from soda, grease, and resin ; the cheaper soaps contain free soda, the dearer ones contain an excess of fat. Yellow

scrubbing soap contains about eight per cent. of free soda. Both soap and soda can be dissolved in water, and are so dissolved for cleaning purposes. Knowing the constituents of our cleansing agents, we can consider their action on paint and varnish. Paint contains white-lead, linseed-oil, and colouring matter. It is not very hard when dry and can be easily scratched with the nail. Varnish is made from linseed-oil, resin, and turpentine. When dry it should be very hard and bright.

The whole of the painted woodwork of the house is subjected to spring-cleaning whatever its appearance with regard to dirt may be. The operator throws into a pailful of hot water a "handful" of soda, soaks a scrubbing-brush in the mixture, rubs it well with soap, and uses it to brush the somewhat soft paint or harder varnish. The soda and soap, aided by the heat, soften the paint and the brush removes a quantity equal to about a coat of paint. The effect is certainly pleasing for the time being, but there will be no difficulty in understanding that the process can only be repeated until the paint and varnish grow shabby or disappear.

It is not wise for the inexpert housewife to trust to unscientific friends for advice as to the best materials to use when cleaning paint. A foreman painter once gave, as a recipe for this purpose, an instruction to add a tablespoonful of "salts of tartar" to three-quarters of a pailful of water. The result was a very rapid and complete removal

of dirt from the paint, but the housewife, being dissatisfied with the rather dull appearance of the white varnish, stroked it with her finger and found that it was covered with a fine white powder. The maid's assurance that this was all right and only needed to be removed by dusting did not satisfy her, and she began to wonder what chemical action was to be expected from "salts of tartar." A first search for information revealed that salts of tartar was an old name for "potassium carbonate," but the housewife knew no chemistry and had never heard of potassium carbonate, so this information was useless to her. She had, however, had some scientific training and was not satisfied to rest in ignorance. A search in a book on elementary chemistry disclosed the further truth that the commercial name for "potassium carbonate" is pearlash! She then remembered that being desirous at one time to remove the paint from some oak carving said to be two hundred years' old, she had successfully used a solution of pearlash painted on with a brush. The paint when dry from the application had been scraped off in long, tough ribbons. Of course the mixture had been very much stronger than that prescribed by the painter, but the effect had been very much more apparent.

Acids and alkalies are to some extent responsible for the fading of fabrics in the wash when these fabrics owe their colour to vegetable dyes. Acids turn vegetable blues red, alkalies turn vegetable blues green and vegetable yellows brown.

It is easy to illustrate this action of acids and alkalies on vegetable colours. A blue liquid can be obtained by boiling a red cabbage in water. If we take two portions of this water and add any acid, say lemon-juice, to one portion we shall obtain a red liquid ; if we add any alkali, say soda, to the other portion we shall obtain a green liquid. If we go a step further and add lemon-juice to the green liquid and soda to the red liquid we may approach very nearly to our original blue liquid. These experiments suggest a remedy for the change of colour in fabrics on washing with soda, but the dyes most commonly used are not vegetable dyes, and the fading of the fabrics is due to chemical changes, into which we have no space to enter.

Strong acids and alkalies act as caustics ; that is they destroy fabrics. Continued washing in strong soda and water not only tends to destroy, but also spoils the appearance of all kinds of wearing apparel and household linen. White silk and wool at once become yellow on being washed with soap that contains free soda, and linen is affected in the same way though not to the same extent.

The widely advertised pastes and liquids for cleaning metal-work, particularly brass, often contain acids or alkalies that are injurious to metals. If after cleaning there should be a green deposit on brass or copper it will be wise to inquire into the composition of such deposit, and to discontinue the use of that paste or liquid. When brass pans are used for boiling fruit for jams, it is usual to rub them inside with a slice of

lemon before putting in the fruit. A careful housewife will consider the reason for this custom. We remember once seeing a copper pan, that had been provided for the preparation of oatmeal porridge, with a band about an inch wide of green crystals on the inside. Inquiry elicited that the cook had thought it a convenient pan in which to prepare the fish (salt haddock) for breakfast. Ignorance of the chemical action of salt and acids on metals may lead to very serious results. The common name for the green deposit on brass and copper is verdigris, and most people know that verdigris is a poisonous compound ; the difficulty is that, not knowing its chemical composition, they do not recognise verdigris when they see it. The cook thought that the complaint made had reference only to the misuse of the pan, and said that it was quite easy to clean the green deposit off !

THE CHEMISTRY OF THE BODY

It is to the science of chemistry that we owe our knowledge of the composition of the various foodstuffs from which dietaries are selected, as well as of the several parts of the human body which relies for its sustenance on those dietaries. But the adjustment of dietaries to the work they have to do is a more complex problem than those we have hitherto considered. We learn from the science of physiology that the human body is a laboratory in which certain juices are secreted for the digestion of foods, and that in this laboratory

foods must be reduced to the consistency necessary for their passage through animal membranes ; for it is by passage through membranes that the nutritive parts of food find their way into the general circulation of the blood which carries them to all parts of the system. Very few foodstuffs are available for use in their natural state, and the majority of them are prepared for consumption in the first place by more or less elaborate processes included in the art of cookery. When thus prepared they should be in a fit state to undergo in the body the physical changes comprised in mastication, and the chemical changes associated with the process of digestion.

It might be surmised by the thoughtful parent that as the child's body lacks some of the external features of the adult body, such as hair and teeth, so there might, and probably would, be corresponding lapses in the internal economy, and that therefore the food prepared for the adult would be, even in the smallest quantity, unsuited to the child. Physiologists tell us that this is so, and in particular that the secretions which in adult life are called saliva and pancreatic juice and which have the function of preparing starch for digestion, are at this time scanty in amount and deficient in chemical action. But these secretions are essential for the digestion of starchy foods, and chemists tell us that starch abounds in the vegetable kingdom from which most of the food of children is derived. It is therefore a matter of some importance that every person in charge of

an infant should have that amount of knowledge of chemical reactions which is requisite to enable them to detect whether a food does or does not contain starch. A child fed entirely on starchy foods suffers from malnutrition of so serious a character that death may, and often does, ensue. Even if other suitable food, such as modified milk, be given, the internal economy of the child will be seriously disturbed.

The names by which patent foods are advertised are very often misleading to unscientific persons, and invalids have suffered much from the mistaken idea that jellies and meat extracts are foods. Meat extracts have their use, but an invalid fed on extract of beef only would die sooner than one left with no food at all. The reason for this can be learned from the knowledge of the constituents of beef extracts and the part they play in the human organism.

CONCLUSION

If we have seemed to lay stress on the value of a knowledge of the sciences of physics and chemistry to the exclusion of the mention of others, our justification of the fact is that space is limited, and that we believe that physics and chemistry underlie all the other sciences, and are of paramount importance to students of all other subjects. In the sciences of biology, physiology, botany, geology, &c., little advance can be made without a knowledge of the funda-

mental laws of nature. The physical laws control movement, and the chemical laws control growth, whether of animate or inanimate nature. Physical and chemical phenomena are concerned in the upheaval of rocks and mountains which govern the contour of the continents of the world. These contours influence climates and peoples ; as the contours change the people change. The dwellers in the mountain regions differ in character from the dwellers in valleys and plains ; the inhabitants of cold districts differ from the inhabitants of warm districts ; but it is people who make history, and historians cannot afford to pass by natural environments and natural laws.

If a foundation of the fundamental sciences be laid at school the student can subsequently build upon it the special science that is suited to his career. It matters little what the calling in life of any person may be; if he aim at success in that calling he must acquaint himself with the laws by which he has his being, and by which he must perforce be guided in all his actions as well as in his intercourse with his fellow-men.

The many avenues now open to women for public work entail on them the responsibility of fitting themselves for that work. They as much as, if not more than, the housewife need to study the sciences which treat of the safeguarding of human life. As councillors dealing with sanitary and building laws, as inspectors of workrooms, of institutions, and of the conditions of child-life, they owe it to themselves and to the community they

serve not to undertake those duties without adequate knowledge. Adequate knowledge must be taken to mean scientific knowledge of those matters of which, by offering themselves for such appointments, they assume an expert knowledge. It is an irony that scientific training should be willingly and even eagerly acquired when it is a question of qualifying for a salaried post for work among strangers, and that a mother should be content to bring to bear on the well-being and lives of her own circle unscientific and amateur experience.

We have only been able to touch the skirt of a great subject, but our end will have been achieved if we have succeeded in pointing the way for a fuller realisation of the aims of earnest men and women for the saving of child-life and the mitigation of disease, and if we have shown how great that subject is—how much too great for anything but the most superficial treatment in a single article.

THE ECONOMIC RELATIONS OF THE HOUSEHOLD

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THE ECONOMIC RELATIONS OF THE HOUSEHOLD

I. INTRODUCTORY

THE household has been treated by economists with curious negligence. The founder of political economy showed so little insight into the real nature of the work carried on there as to class those whom he described as menial servants with unproductive labourers.[1] The later classical economists have followed his lead. Marshall, it is true, shows throughout his books an appreciation of the position and responsibilities of the housewife and the mother which is foreign to most of his colleagues.[2] But he has never attempted to analyse the economic functions of the household, or to show its varying relations to the rest of the community; neither has he pointed out the peculiar factors which differentiate the position

[1] Smith, "Wealth of Nations," edited by J. S. Nicholson, pp. 135 and 280. It is of course true that Adam Smith meant by this merely what is in a way true, that domestic servants earn no profit for their employers. He does not deny (p. 136) that their labour "has a certain value." But, like all the economists who followed him, he is content to dismiss domestic workers with this cursory treatment and to identify labourers with the workers hired for profit-making purposes.

[2] See "Principles of Economics" (4th ed.), pp. 192, 772.

and remuneration of the women employed in domestic activities from those of all other workers. On the other hand, the more modern school of economists, those who devote themselves to the history of economic development in the past or to the intensive study of special economic institutions in the present, have equally failed to discuss with any adequacy the organisation of the household.

The economic historians describe with minuteness the rise and fall of gilds and chartered companies, the workings of different methods of education and of poor relief in successive epochs. They rarely indicate how the various forms of industrial organisation translated themselves into the domestic expenditure of the people. It would, for instance, be very difficult to extract from the pages of the economic historians an answer to the question, "What were the conditions determining the supply of domestic servants at the close of the Middle Ages, in the eighteenth century and in the nineteenth century respectively?" It is not easy to answer definitely even simpler and more fundamental questions than these. It is often stated, for example, that the household arrangements of the serfs on the mediæval manors were rude and uncomfortable to the last degree,[1] but it is certain that this is not so universally true as has been thought. Some at all events of the more

[1] Marshall, "Principles" (4th ed.), p. 764: "The working classes had then no other beds than loose straw, reeking with vermin and resting on damp floors."

prosperous inhabitants of the manors possessed household furniture and equipments of a kind not inferior to the outfit of the casual labourer to-day. Sheets, for example, are mentioned several times in extant inventories. But much more investigation than has yet been possible would be necessary before it could be determined whether these instances of a higher standard of comfort are or are not exceptions to a general rule.

To take other instances of unsettled problems: How was pottery made in the Middle Ages—by travelling potters as in the East to-day, by gilds of potters, or by the inhabitants of the manor directly for their own use? Or again: When did the custom of building houses to let on rent first become general in England? It is clear that the habit of living in rented houses has and must have the most profound influence on family life and national character. But so far, neither from economic histories on the one hand nor from histories of architecture on the other, have I been able to obtain any reliable information on this point.

When one turns to even more important questions—such, for instance, as the industrial position of women at different epochs—it is equally difficult to obtain precise and detailed knowledge. Without a very lengthy and elaborate investigation of the extant original materials, many of them scattered in municipal chambers in distant parts of England, it would be quite impossible to say on what terms women were admitted as members of

the gilds and fraternities which extended over the whole area of industrial life in the Middle Ages. The character and organisation of the household and the position of women in the Middle Ages are subjects still practically untouched by the economic historians.[1]

When we turn to modern times, a little more material has been collected. There is an investigation by the Board of Trade into the wages of domestic servants, and a book on domestic service by Professor Lucy Salmon of Vassar College. It deals of course mainly with American conditions, but cannot be neglected by any English student of the economic relations of the household.

Humanitarianism has prompted studies more or less elaborate of the dietaries and housing conditions of the working classes, especially in towns,[2] but it would be idle to pretend that there has been yet more than a beginning made of the task of determining how for each class of the community its share of the national income as stated in money is translated into the necessaries, comforts, and luxuries of life, into house-room, fuel, food, cleanliness, clothing, insurance, domestic service, recreation, and culture. The generalisations available are of the most meagre description. We can, for instance, say with tolerable certainty that the agricultural labourer spends three-fourths of his income on food, the town labourer two-

[1] Thorold Rogers is a partial exception.

[2] *e.g.* Rowntree, "Poverty: a Study of Town Life;" portions of Booth's "Life and Labour of the People;" reports to the Board of Trade on the cost of living.

thirds, the artisan a half, the middle-class man from a third to a fourth ; but there is practically no reliable information with regard to very large incomes, or to sums spent on clothing in *any* section of the community.

Moreover, there is one class—large, growing in importance, and an essential element in modern civilisation—about whose domestic expenditure we have no scientific knowledge at all. This is the class which may be named "the routine brain-workers," the people who as clerks, book-keepers, salesmen, typists, &c., are responsible for the routine administration of modern commerce. They have been compared to the nervous system, for like that system in the animal body they serve for the communication and the mechanical record of the life of the community on its industrial side. With them may be classed elementary school-teachers, reporters, and the lower ranks of the Civil Service, though I should not be prepared to say that some of these—especially the teachers —ought to be regarded as performing only routine brain-work. But all these workers can be conveniently studied together in that their labour is carried on under somewhat similar conditions—it is sedentary, highly regimented, exhausting to the brain and nervous system, and is generally remunerated by a fixed salary, &c. They earn an income larger than that of the manual labourer, but considerably less as a general rule than that of the professional man. There is a total absence of information as to the domestic expenditure of

this class. It is sometimes declared that its less well-paid members suffer as severely from poverty as do sections of the working-class, and that the poor clerk is really much more to be pitied than the well-to-do trade unionist, the skilled manual worker.

But no one has yet attempted to test the truth of this view by the only scientific means, namely, by the collection of precise details as to the domestic expenditure of the routine brain-working class, showing what sums are spent on house-room, food, clothing, &c., and what kind of accommodation is obtained for the money spent. In short, the investigation of domestic expenditure has never yet been carried out in a purely scientific spirit solely for the sake of the resultant knowledge. It has always been undertaken with some special practical problem in view, and is consequently always fragmentary and frequently biassed.

Yet if it is important to know how the wealth of the country is produced, it is of equal importance to know how it is consumed, and that whether the consumption takes the form of porridge and flannelette for the child of a dock-labourer, of drink and admission to a football match for the miner or cotton-operative, or of a gardener, and a holiday in Switzerland for the hard-working doctor or stockbroker. Domestic expenditure should be investigated as impartially by the economist as are the variations of plants or animals by the biologist. His one aim should

be the discovery and statement of truth, as complete and as unbiassed as he can make it.

Hitherto, as I have said, this field of research has remained comparatively untouched. In the first place, economists have generally been men, and have naturally devoted their energies to the elucidation of the problems of industry and business which concern men most closely. Few women, on the other hand, have until recently received any training in economics, and it has never occurred to them that the familiar and wearisome problems of the rent, the butcher's bill, and the children's clothes, together with the difficulty of finding a satisfactory cook, may have a wider aspect than the narrow and personal one. But even as it is, the few women who have distinguished themselves in the sphere of economics have in a note or a casual remark pointed out distinctions between household management and other branches of industry which cast a flood of light on the whole subject. There is a paragraph in the second volume of "Industrial Democracy"[1] which lays down the difference between the underlying principles of business and of the administration of the home in a few words which might serve as the text for a volume. It is precisely this difference, first clearly indicated by Mrs. Webb, which constitutes the second ground for the common neglect of this branch of economics. A factory or a shop is run for profit; a household

[1] Webb, S. and B., "Industrial Democracy" (cheap edition), p. 674.

simply to provide comfort and convenience for its members. To put it in technical language, in the world of industry we are concerned with exchange values, but in the home with use values alone. From this distinction, overlooked by reason of its obviousness, there flow a large number of consequences which will be discussed later. At present we are only concerned to show that economists, with their eyes fixed on trade and the mechanism of trade, very naturally neglected that section of life in which values, material and immaterial, were being continually created, but for use alone, not for commercial purposes.

The wife who cooks her husband's dinner, or caters, organises, and keeps accounts for him, is really engaged in work which in any rational interpretation of the word has far more right to be called productive than is much of the labour employed in manufacture or business. But the work accomplished by the wife in the household has never yet received its full acknowledgment from the economists. The truth is that, although they constantly warn students to avoid the vulgar error of confusing money wages with real wages, they themselves have been so biassed by the commercial conception of profit-making that they have almost completely overlooked even the purely economic value of much work, such as cooking, cleaning, and clothes-making, which is carried on within the home, not for profit-making or for a salary, but as part of the duties attaching to the status of wife and mother. It is acknowledged

by the economists themselves[1] that although in theory they have set aside a section to be devoted to the discussion of "consumption" as other sections deal with "production" and "distribution" of wealth, yet in practice the treatment of consumption has been meagre and ineffective. This, perhaps, is inevitable—it is certainly regrettable—and women economists would be performing a most useful work if they were to undertake a careful and detailed investigation into the consumption of wealth at different epochs and by different classes of the community, and one, moreover, for which their connection with house-keeping, which is only the practical application of the science of the consumption of wealth, would have already partially prepared them.

There is still another reason why a scientific treatment of the consumption of wealth has been delayed. It could not be developed until medicine and hygiene had provided us with satisfactory standards of the needs of the human body. When food, for example, was still regarded purely as a matter of individual likes and dislikes, it was impossible to discuss at all adequately the sufficiency or insufficiency of the food consumption of a given class. But now that we know that the varying tastes simply express in different ways the need for so much proteid, carbo-hydrates and fats, we have a firm basis on which to work. It is true that it is not yet quite so firm as we could

[1] Marshall, "Principles of Economics," vol. i. p. 159.

wish; the scientists have not yet succeeded even for a single class in fixing a dietary standard which would be accepted by all in particular, and recently the investigations of Professor Chittenden have suggested that the amount of proteid hitherto thought essential may be excessive. Moreover, little attention has yet been paid to the need of different food for different work. Yet it seems probable, to say the least, that the sedentary worker, using his brain and not his muscles, may require lighter and daintier food than the labourer in the fields or the docks, and may really suffer as seriously if that better food be denied him as does the latter if he fails to secure a sufficiency of coarser and cheaper nutriment. This question would be of great importance in investigating the expenditure of the clerk class. But although the scientists have here failed to provide the students of domestic expenditure with all the data required, yet there is sufficient knowledge of the general principles of dietetics to enable us to base our study of food consumption on a fairly sound basis.

In the same way a standard of housing accommodation establishing the minimum of space per head necessary for health is generally recognised; and on these and similar calculations, correlated with the cost of house-room and commodities, it will be possible to build up a science of consumption which will be really a science and not a series of guesses and vague generalities.

It is true, again, that it is easier to deal with the grades of society practising the roughest and

least-skilled labour than with those engaged in the higher forms of brain-work, but we can at all events set ourselves to discover what *is* the average distribution of the expenditure of men earning £1000 a year, and can afterwards appeal to the hygienists to decide for us what kind of food, house-room, and recreation is essential for a man who makes his living by the higher activities of the intellect. A very close connection between economics and hygiene is essential if the division of our subject that deals with consumption is to be adequately treated.

So, then, a scientific study of the economics of the household would fall into two divisions—(1) an endeavour to describe the industrial development of each country as it affects family life, house-room, food, and clothes ; and (2) a descriptive account of the domestic circumstances and the expenditure[1] of each class of the community at the present time. Under each of these headings

[1] There is an assumption here which needs perhaps some discussion, *i.e.* that expenditure or consumption of goods can be most conveniently studied on the basis of family life. This is obviously the case with house-room, food, fuel, cleanliness, &c., less so with regard to clothes or recreation ; it was truer of the past than of the present, and is truer of the poor than of the rich. In some classes, *e.g.* the professional class, where marriage is commonly delayed and a considerable period may intervene between the end of education and the establishment of a fresh household, it may be necessary to supplement the study of family expenditure by a consideration of the standard of living of unmarried men and women. Attempts, too, must be made to deal with the various forms of institutional life, varying from prisons and workhouses on the one hand to expensive boarding-schools and hotels on the other. But when all these necessary deductions have been made, it remains true that in order to study expenditure we must in the great majority of cases take the family as our basis of investigation. Consumption is organised on a family basis.

special sections should treat domestic service, the work of woman beyond the household, and the organisation of household work as compared with different branches of industry and administration. Finally, a supplementary section should set forth the practical applications of the conclusions arrived at, and should endeavour to help the housewife or, it may be, the superintendent of an industrial school, college, or boarding house in the administration of the income at her disposal.

But much more careful investigation into the question of how incomes actually are spent is essential before we can deal satisfactorily with the even more difficult problem of how they ought to be spent. And there is, too, another factor which must be taken into consideration. Economists in defining wealth commonly admit nowadays that it includes collective and immaterial well-being of various kinds.[1] But having made this admission, they straightway put it aside and proceed to discuss wealth as though it consisted exclusively of material exchangeable commodities. Yet clearly the real income of a family is increased if the children have easy access to good free schools or to ample open spaces. It will not be possible to estimate precisely the money value of opportunities of this description. But we should at least notice their presence or absence for each class and for each stage of national development. It is clear that in the present paper no attempt can be made

[1] See Marshall, "Principles," book ii. chap. ii.

to deal with the problems of the economics of expenditure or of the household save in the merest outline, and therefore the following pages are to be taken simply as a sketch to be filled in by more extensive and more throughgoing investigation later on.

II. HISTORICAL SKETCH OF THE POSITION OF THE HOUSEHOLD IN ENGLAND

English industrial history has been divided into three main epochs with intervening periods of transition. These are (1) the mediæval period, (2) the period extending from Elizabeth's reign to the reign of George III., and (3) the modern period.

In the first, the typical economic institutions are the manor and the gild; in the second, domestic manufacture and convertible husbandry are predominant; and in the third the factory system and capitalist farming take their places.[1] Trade, too, undergoes a similar evolution. In the first period it is intermunicipal rather than international. In the second period, within each nation trade is free and unfettered, and a considerable amount of territorial division of labour and regional specialisation results. But external trade is regulated by governments on the principles of the mercantile system. In the third period, with the increase and improvement of the means

[1] Ashley, "Economic History," vol. i. part ii. p. 262.

of communication, international trade becomes more and more important, markets are immensely widened, and the economic organisation of society reaches the complexity possessed by it to-day, which reacts in many half comprehended ways on the household and on family life.

The main characteristics of these divisions of English industrial history are, on the whole, clear and well-marked. But the transition periods are more difficult to describe. It has often been pointed out that the two industrial revolutions, as they have been named by some writers, bear a certain resemblance to each other. Both involve a reorganisation of industry which results in increased productivity on the one hand, but in the demoralisation of certain classes of the workers on the other hand. Both therefore require a revision of the system of providing for the destitute. Both, too, produce the most far-reaching effects on home-life and the economy of the household, and influence profoundly the position of women. Both, too, are alike in that it is not easy to fix dates to the periods within which the revolution in industry takes place.[1] But roughly

[1] The economic historian must always be prepared to acquiesce in a certain vagueness in the matter of dates. He is not dealing with definite events, such as battles and the enactment of special laws, but rather with social tendencies, each constituted by a large number of small events; such as, for instance, the replacement of hand labour by machinery, the appearance of limited liability companies in the place of the single employer, or the determination of middle-class girls to earn their own living instead of remaining dependent on father or brothers. Tendencies such as these appear at different times in different industries and in different parts of the country, and only a misleading precision can be gained by any mention of definite dates.

we may regard the late fifteenth century and the early part of the sixteenth as a time of stress and strain, due to the appearance of new methods both in agriculture and in industry, especially in the wool trade; and in the same way the end of the eighteenth century and the beginning of the nineteenth was a period of sudden and violent economic transition. In both cases alike the changes in agriculture preceded somewhat the changes in industry, and the revolution made itself felt in different ways and at different times in the various districts of the country. There are still backward areas in the south of England and in the west of Scotland where life has been very little affected, notwithstanding trains and steam-engines, by the alterations in industry which have produced the roaring mills and clattering shipyards of Lancashire and the Clyde.

The task before us, then, is to sketch as clearly as possible from the scanty material available the main features of domestic life at each one of these epochs, and to show how the changes in industry reflected themselves in the life of the household.

(*a*) The Household in the Mediæval Period

(1) *The Serf—his Position and Domestic Arrangements*

In the mediæval period, outside the small and scattered towns, the prevailing form of economic organisation was the manor. We have to imagine

the surface of England dotted over with stretches of cultivated land, with areas of waste, moorland or woodland intervening. Each stretch of arable land was cultivated more or less in common by groups of serfs, who lived generally in one long village street, with the church and the lord's hall near at hand. Usually, in addition to the arable land worked on the complicated "three-field" system soon to be described, there were also hay-meadows down by the river, sometimes permanent pasture held in common, while the waste was available for extra pasturage, and for cutting turf and wood for fuel. Each serf possessed, besides, a small croft attached to his house, and sometimes an orchard and rude garden. The arable land was divided into three large fields, not shut in as are our fields by hedges, but lying open. Each field, again, was partitioned into numbers of strips more or less regular in shape, and each serf possessed a certain number of these, not, however, all lying together, but intermixed "mingle-mangle" with the holdings of his neighbours. He was not allowed to cultivate these, or indeed any of the land save his own tiny croft, as he pleased, but was compelled to follow the traditional method of farming according to the customs of his manor. Usually the rotation was wheat or rye in the first year, oats or barley in the second year, fallow in the third year, while the other two fields followed the same course a year and two years later; so that in each year one field was fallow, one grew wheat or rye, and the other oats or barley. The

animals belonging to the serfs and their lord were pastured on the arable fields when the crops were taken off, and on the fallow field. The lord of the manor also possessed strips in the common fields, and was regarded as the owner of the common and waste, subject to the pasturage and fuel rights of the tenants. He did not receive rent quite as we understand it, but each serf owed him dues calculated in labour, in kind, and occasionally in money.

For instance, on the manor of Tidenham, in the time of Edward I., one serf worked for the lord for five days in every alternate week for thirty-five weeks in the year, two and a half days every week for six weeks in the summer, and three days every week for eight weeks during August and September (the three festival weeks of Easter, Christmas, and Pentecost were holidays). Then, in addition to this regular weekly work, he could also be required for extra work, commonly called boon-works or precariæ. "He made one precaria called churched, and he ploughed and harrowed a half acre for corn and sowed it with one bushel of corn from his own seed, and in the time of harvest he had to reap and bind and stack the produce, receiving one sheaf for himself on account of the half acre." And he had to plough one acre for oats. In addition, there were dues in kind—one hen at Christmas, five eggs at Easter, eight gallons of beer at every brewing, and also small payments in money, commuted, one would conjecture, for payments in kind, *i.e.* one penny for every

yearling pig, and one halfpenny for those only of the half year.[1]

In other cases the tenants paid dues of lambs, of fish, of honey, of clews of net yarn, of straw, &c. One of the tenants of the great monastic establishment at Glastonbury had to find thirty salmon, "each as thick as a man's fist at the tail."[2] A curious form of labour due is described in the Boldon Book. The tenants of certain manors in Durham had to build each summer a hunting-lodge for the bishop and his retinue when they came to take their pleasure in the moors in the west of Durham.

At different periods and in different districts the subdivisions of the tenants vary greatly, and for complete details the reader must be referred to the special works on the subject. But two classes can usually be distinguished—(1) the villeins, who possessed oxen and worked the larger holdings (often about thirty acres—called virgates or yard lands); and (2) the cotters, who held about five acres, and whose domestic animals consisted of pigs and poultry. In addition there were often found socmen, who were personally free; and, at the other end of the social scale, slaves, who, largely through the influence of the Church, were manumitted before the end of the Middle Ages.

The most striking feature about the manors is that each was almost completely self-supporting.

[1] Summarised from Seebohm, "Village Community," pp. 156–157.
[2] Gasquet, "English Monastic Life," p. 197.

Each manor provided corn, meat, eggs, milk, cheese, poultry, &c., for its own inhabitants. Fuel, and perhaps game and rabbits, came from the waste. The furniture was of rude wood, and the clothes would be sheep-skin and coarse cloth spun and woven from the wool grown on the sheep that were fed on the manor lands. The ordinary serf would very rarely either receive or spend coin of the realm. Salt he would buy and the metal pots and pans used for cooking, and, as Ashley suggests, tar.[1] But the greater amount of the goods required for himself and his family would be produced under what the economists call "natural economy," *i.e.* they were made by the people who intended to use them, directly, without the intervention of money or any mechanism of exchange.

Together with this self-sufficiency would go a considerable amount of co-operation. Economists are not yet agreed as to the precise extent to which co-operation was used in the manorial village. But we know that tenants frequently lent their oxen to one another to make up the necessary team; that in some of the Durham manors there was a communal smith, who received payment in the possession of a strip of land; and that the tenants owned a common oven. It was customary, too, for one shepherd or swineherd to guard the sheep or the pigs of the whole community. The village mill, when

[1] "Economic History," vol. i.

first established, was also a common boon to the whole body of serfs, but later on the obligation to grind their corn at the lord's mill and to pay the dues came to be regarded as an onerous burden.

A curious and important person on the mediæval estate was the bee-keeper. Particulars are given of his duties and rewards in one Durham manor by the Boldon Book.[1] He does no regular weekly work, the care of the bees apparently taking the place of this, but he must take part with the other serfs in the boon-works necessary at harvest and other times of pressure. As honey was almost the only source of sweetness in early mediæval cooking, it can be understood why the bee-keeper ranked only a little below the shepherd. The Boldon Book, unfortunately, since its aim is to define the relations between the villeins and their lord, does not tell us whether he superintended the bees belonging to his fellow tenants. On the analogy of the shepherd and swineherd, we should assume that he did.

How, then, are we to describe the domestic life of the various sections of rural society at this time? Unfortunately, very little material exists on which to draw for the account of the household arrangements of the serfs. They have naturally left no account-books; they enter rarely into the literature of the period; there are no remains of their houses or clothing, and it is, in

[1] Surtees Society, Boldon Book, p. 28.

fact, far from easy to decide how they did live. But it seems probable that a rude and dirty plenty, procured by long hours of toilsome open-air labour, was the prevailing characteristic of the serf household. The house would be of clay or wattles or wood, probably without windows—and those certainly unglazed—and with a hole in the middle of the roof to let out the smoke, the fire being placed in the centre of the floor. The furniture must have been rough but solid, its most valuable items being the brass or iron cooking-pots. On the other hand, I do not believe that, in the more prosperous villein households at all events, the level of domestic comfort was so low as has sometimes been represented. Rough cloth was probably woven or sometimes bought. There is one case on record where, in return for a small piece of land, one family undertook to do the weaving for another, and Gasquet mentions[1] that to the common Christmas feast on one of the Glastonbury manors some of the tenants brought their own napkins, "if he wanted to eat off a cloth." I see no reason to doubt that some at least of the villein households were provided with coarse coverings for bed and table. On the other hand, it seems doubtful whether any form of artificial light was commonly used in the poorer households. The food, too, would show what to us would seem strange contrasts of plenty and of poverty. It would include neither tea nor

[1] "English Monastic Life," p. 198.

coffee, neither sugar nor spices, nor yet potatoes. On the other hand, there was probably, save at times of famine, a sufficiency of bread,[1] and eggs and dairy produce would be used in quantities now quite beyond the reach of the ordinary working-man. The butter, it is true, was not of a high standard, for it was usually liquid, but the children must have had milk to drink and cheese and eggs to eat. Even the poorest serfs apparently kept a few fowls, since their dues are so often payable in eggs, and some of the eggs and the chickens would be available for family consumption. But their meat must have been much poorer than ours. Fresh mutton and beef were rarely eaten, except in the case of animals who had died a natural death. The others were much too valuable for draught purposes, for milk or for wool. Among the maxims of an old agriculturist of the thirteenth century we find the following remark: "If a sheep die suddenly, they put the flesh in water for so many hours as are between midday and three o'clock, and then hang it up, and when the water is drained off they salt it and then dry it. But I do not wish you to do this."[2] In the autumn, animals which it was

[1] The English were famed in the Middle Ages for their preference for good bread. They would eat no bread

"That beans in come,
But of cocket * or clerematyn * or else of clean wheat."

—*Piers Plowman*, A. vii. 292.

[2] Walter of Henley, p. 29.

* Better kinds of bread, but not the best (wastel).

impossible to keep during the winter, owing to the absence of root-feeding, were killed and salted down. Occasionally, however, fresh pork would be used, and no doubt every now and then a wild beast or bird from the common or waste would find its way into the housewife's iron pot. The food, then, would be rough and sometimes unwholesome, but on the other hand it contained many most desirable forms of nourishment which are absent from the labourer's diet to-day, and which are, it might be observed, those specially suitable for children.[1]

The fuel used was wood or peat, or in some cases dried cow-dung.

On the whole, then, the household arrangements of the mediæval serf were primitive, and in times of famine he and his family must have endured great hardships. The winters, too, when the tracks were deep in mud and artificial light was absent or scarce, must have been recurring times of considerable suffering. But on the other hand, fresh air and easy access to the land were benefits hardly valued until in later times they have been lost to whole sections of the population.

(2) *The Lord of the Manor—his House and Household*

There is more material available for the description of the household of the lord than of his serf. Account-books, directions for household adminis-

[1] Apparently, it is only within the last hundred years that the cow has ceased to be a normal possession of the agricultural labourer. See Slater, "English Peasantry and Common Fields," pp. 122–128.

tration, and in the fifteenth century very curious rhymed rules of behaviour and of precedence are available. Naturally, however, it is of the king's household and of the households of the nobles and of the great monasteries that we know most. Very little can now be discovered of the details of the domestic arrangements of the master in possession of one manor only, and it is not certain that we should be justified in supposing that what we find to be true of the great household will necessarily hold also for the smaller one. For example, in the families of which we have records the great majority of the servants are men, cooking in particular being in the Middle Ages a masculine vocation. But is it safe to assume that the same would be the case in the household of a simple knight? It must therefore be clearly understood that what follows has reference mainly to royal and noble families.

The domestic buildings of all manors were on a more or less uniform plan. They were grouped round a quadrangle, one side of which consisted of the great hall where dinner was served, business transacted, and where servants and the humbler guests slept at night. The door was at one end, usually protected by screens, behind which was another door leading to the buttery, and above which the musicians' gallery was often placed. Opposite the door was a raised daïs, where stood the table reserved for the master, his family, and important guests. In the body of the hall dinner was served to the rest of the household. A private

chamber called the solar or bower, reached by a staircase either inside the hall or placed in the quadrangle outside, was kept for the special use of the lord and his family. There occasionally they took meals, though it was regarded as a sign of luxurious self-seeking to avoid the formality and bustle of the meals in the great hall. In the solar, too, beds were placed for important guests, and any particularly valuable articles of furniture would be kept there. On the other sides of the quadrangle were the chapel, granaries, store-houses, dairies and bakehouses, and the kitchen. This was often placed at a little distance to guard against fire. The cooking was usually carried on at an iron grate placed in the middle of the floor, and pictures show us that sometimes it was even done in the open air. Refuse was carried off by an open drain running across the centre of the kitchen.

As an illustration let me quote an account of a typical manor-house of the twelfth century. "The manor-house of Ardleigh consisted of a hall with bower annexed. Also a kitchen, a stable, a bake-house, two stores for corn (granges) and a servants' house. In the hall were two moveable benches, a fixed table, and a buffet." [1]

In course of time other rooms were added, and the furniture and equipment became more elaborate. But until Elizabeth's reign the great hall where master and servants dined together was the central feature in the wealthy English home.

[1] Eddy, "English House," p. 133.

The food was derived from the manor, and purchases were only made of such things as could not be produced in England, notably red wine,[1] spices, almonds and rice, all much used in mediæval cookery. Sugar, too, would be bought, when it replaced honey for sweetening purposes. But the corn, meat, milk, cheese, and eggs would be all home-grown, and as it was easier in the state of transport at that time to bring the family to the food than the food to the family, part of the duties of housekeeping consisted in so arranging the sojourn of the household as to draw food-supplies from each manor in the most convenient way. The great Bishop of Lincoln, Robert Grossetête, gives elaborate directions on this head to a widowed friend of his, Margaret, Countess of Lincoln.

"Every year at Michaelmas when you know the measure of all your corn, then arrange your sojourn for the whole of that year and for how many weeks in each place according to the seasons of the year and the advantages of the country in flesh and in fish, and do not in any wise burden by debt or long residence the places where you sojourn.

"I advise that at two seasons of the year you make your principal purchases, that is to say, your wines, your wax, and your wardrobe."[2]

And there follows a list of the fairs recommended by the pious bishop.

The materials of mediæval food, then, would be

[1] England at that time possessed her own vineyards, *e.g.* near Gloucester, and produced white wine.

[2] Rules of S. Robert as given in "Walter of Henley," p. 145.

similar to the diet of the serfs already described, but would be used in greater plenty and would be supplemented by luxuries imported from the East and bought at the fairs. If we keep in mind these conditions, as well as the leisure and the large supply of labour available, we shall understand why mediæval cooking was so elaborate ; for, contrary to ordinary opinion, it was distinguished by a large number of complicated made dishes. Small birds were commonly roasted, but other forms of meat were stewed or minced. They would in this way both be more easily dealt with at the open fire of the mediæval kitchen, and more easily served in the mediæval dining-room, where knives and spoons were the only implements in common use. Moreover, there was what seems to us an extraordinary liking for violent and mixed flavourings and brilliant colouring. Bucknade, for instance, was made of meat hewn in gobbets, pounded almonds, raisins, sugar, cinnamon, cloves, ginger, onions, salt and fried herbs, thickened with rice-flour and coloured yellow with saffron. Here, again, is the recipe for mortrews, a dish mentioned in Chaucer's "Canterbury Tales."

"Take hennes and pork and seethe them together. Take the flesh of the hennes and of the pork and hack it small and grind it all to dust. Take bread y-grated, and add thereto and temper it with the self-broth [1] and mix it with yolks of eggs, and cast thereon powder fort,[2] and boil it and do thereto powder of ginger, saffron, and salt,

[1] Broth in which the meat had been boiled. [2] Pepper.

and look that it is standing,[1] and flour it all with powder of ginger." The lavish use of eggs, pork, and chickens in this recipe could be paralleled in many others, and is evidently to be connected with the custom of receiving manorial dues in kind at stated intervals. Hundreds of eggs would be sent in by the tenants at Easter, and the problem of the housekeeper would not be how to lessen the consumption of eggs in order to keep down the bills, but how to get through those in store before they were hopelessly spoiled.

For the earlier period menus are not available, but a curious rhymed treatise on servants' duties dating from the middle of the fifteenth century, entitled "John Russell's Boke of Nurture," has been reprinted by the Early English Lent Society[2] in the volume entitled "Meals and Manners of the Olden Time," and from it I extract the following :—

Furst set forth mustard and brawne of boore, the wild swine,
Suche pottage as the cooke hath made of herbis, spice, and wine,
Beef, mutton, stewed feysaund, swan with the chawdyn[3]
Capoun, pigge, venisoun bake, leche lombard,[4] fritter, viant fine,
And then a soteltie.[5]
Maydon Marie that holy Virgin
And Gabrielle greeting her with an ave.

[1] Stiff. [2] "Meals and Manners of the Olden Time," p. 164.
[3] Kind of sauce.
[4] Pork, eggs, cloves, currants, dates, sugar boiled in a bladder, cut into strips and served with hot rich sauce.
[5] A soteltie was an elaborate confection of pastry painted or adorned with paper to represent a saint or a figure of spring, summer, &c.

This is followed by two other courses rather lighter in character, though still including venison, peacocks, quails, &c., and then comes dessert:

> After this delicatis mo,
> Blanderelle or pepins with caraway in confite,
> Wayfurs to eat, hypocras [1] to drink with delite.

The service in the wealthy mediæval manor was as elaborate as the cooking, at all events in the later period. The Bishop of Lincoln finds it necessary to warn the Countess of Lincoln not to permit slovenliness among her retainers. She is not to allow "old tabards, and soiled herigauts, and imitation short-hose." But even this widow lady is served with considerable pomp. "Command that your panter [2] with the bread and your butler [3] with the cup, come before you to the table foot by foot before grace and that three valets be assigned by the marshal each day to serve the high table and the two tables at the side with drink. And at each course call the servers to go to the kitchen, and they themselves to go always before your seneschal as far as you until the dishes be set before you, and see that all servants with meats go orderly and without noise to one part and another of the hall to those who shall be assigned to divide the meats, so that nothing be placed or served disorderly." [4]

In the "Boke of Nurture," which refers of course

[1] Spiced wine.
[2] Panter and pantry, from pain.
[3] Butler = bottler.
[4] Rules of S. Robert in "Walter of Henley," pp. 138–140. *passim.*

to a much later period, the service is even more elaborate, and we gather indeed that the dinner was a social function at which all classes of the community met together. Even the poorest were not forgotten, as there was a special officer whose business it was to distribute alms of broken meats to the beggars waiting at the door. The rules of precedence were most elaborate, and the serving seems on special occasions to have risen almost to the rank of a solemn ritual. In addition, dinner was accompanied by music and sometimes enlivened at intervals by pageants and shows.

Domestic service in these great households was very different from what it is to-day. There was, in the first place, no fixed line drawn as there is now between the menial and the non-menial classes of the community. The higher servants were often people of nearly the same social rank as those whom they served. Sir William de Mortimer was the head-steward of Bishop Swinfield, Sir Gilbert Brydges the steward of Gloucester Abbey.[1] Young men who entered the service of a lord might one day be called on to carve or serve wine, and the next day might sit at meat in the same room.[2]

Through the account-books and the household ordinances of the period, we can trace four grades of household servants—squires or gentlemen, valets or yeomen, grooms, and pages. The last grade had been recently introduced into the royal house-

[1] Webb, "Essay on Gloucester Abbey," p. 13.
[2] "Meals and Manners," p. 74.

hold in Edward IV.'s time, and they did not eat in hall. "A page etyth in his office or with his next fellow, not in the halle at noe place, taking dayly one lofe, one messe of great meate, half a gallon of ale ; one reward quarterly in the counting-house, twenty pence of clothing when the household hathe at every one of the four feasts, one napron of one elle and part of the King's great rewards given yearly amongst them in household."[1]

The last quotation illustrates also the method of remuneration. The money received was a very minor and unimportant factor. The servants were paid mostly in kind, and the share of each in food, fuel, and clothing is very fully and carefully stated. The chief porter of the Abbey of Gloucester, for instance, had a chamber next to the abbey gate. His weekly allowance was three white loaves, called myches, and two called holyers, with seven loaves of squire bread ; for ale every quarter 3s. 4d. On every flesh or fish day he had a mess of flesh or fish of the first course, as much as was set before two monks. He had a gown every year of the suit of the gentlemen of the Lord Abbot, and in addition 13s. 4d. per annum. These fixed rations of food clothing &c., are called livery, a term now restricted to clothing alone.

It is noticeable that these servants are almost all men. Washerwomen (lotrices) are women, and there are occasionally notices of young girls

[1] *Libes Niges Domus*, p. 65.

in attendance on the lady of the house. But so far as our information goes, cooking and cleaning and serving are carried on by men, though mention is made of women pastry-cooks who in monasteries, to avoid scandal, had to be accommodated in a separate kitchen, called the pudding-house.[1] But in the Middle Ages domestic service was not, as it is now, regarded as a menial occupation to be left, save in some of its higher branches, exclusively to women.

I can find no trace at this period of any difficulty in obtaining service. Bishop Grossetête assures the Countess of Lincoln that she can easily obtain servers if she needs them, and the young men addressed in the rhyming exhortations preserved in "Meals and Manners" evidently regard it as promotion almost beyond their hopes to become members of a lord's household. Whether this would be equally the case if we had information about the smaller households, it is not easy to say. But when we remember that the alternatives were laborious and monotonous work at agriculture or the chance of finding a place in the gilds or fraternities which monopolised the trade in towns at that period, we can believe that the plentiful fare, the lively society, and the not too strenuous[2] work required of a serving-

[1] Gasquet, "English Monastic Life," p. 211.

[2] The maintenance of a large retinue was one of the easiest ways available for indicating the possession of surplus wealth. This fact, coupled with the almost absurd over-elaboration of the details of serving, incline me to believe that in the mediæval castle servants were numerous and not overworked.

groom or yeoman would be regarded as a prize worth striving for and worth keeping.

It would be interesting, had I more space at my disposal, to discuss mediæval town life and the domestic arrangements of the monasteries, which are very fully and interestingly described in Abbé Gasquet's book, "English Monastic Life." But I must content myself solely with one or two extracts illustrating the household furniture of the mediæval town-dwellers.

In 1303, a certain Alan de Bedeford, a baker of London, was sold up for arrears of taxes, and the following were the goods seized by the inexorable tax-gatherer: "One brass pot weighing 18 lbs., value 2s. 6d., and another brass pot weighing 13 lbs., value 21d., and one kettle value 14d., the total whereof amounts to 5s. 5d."[1]

In 1337, an inventory was preserved of the goods of a felon. It was probably exhaustive, and may therefore be taken as indicating with tolerable precision the standard of household comfort of a London burgess at that time. It is too long to quote in full (the list of garments in particular is rather tedious), but it is interesting to note that it includes a mattress, three feather-beds, five cushions, six blankets, seven linen-sheets, four table-cloths, six whole brass pots of varying value and one broken one, one candle-stick and two plates of metal, two basins and

[1] Riley, "Memorials of London," p. 48.

one washing-vessel, a spit, a frying-pan, and a funnel.[1]

Further study of wills and inventories would yield a fresh store of information with regard to mediæval household equipment, and might not improbably upset some preconceived ideas as to the ordinary standard of life at that time.

(*b*) The Position of the Household from the Fifteenth to the Nineteenth Centuries

(1) *The First Industrial Revolution and its Effects*

The fifteenth century and the beginning of the sixteenth century were marked by great economic changes. The manorial system, modified before this period by the gradual commutation of labour dues and especially by the catastrophe of the Black Death, was replaced on the one hand by enclosures for sheep-farming and on the other by convertible husbandry, when the farmer possessed or rented his own separate holding and managed it as he pleased, using the same land alternately for pasturage and as arable.[2] At the same time, the gild organisation of industry was replaced by the system commonly known as domestic manufacture. This spread largely in the country

[1] Riley, "Memorials of London," p. 199. There is, unfortunately, no indication of the social standing of this felon, Hugh le Bevere by name. The list of clothes suggests that he was fairly well-to-do, in which case his equipment of cooking and table utensils is certainly meagre. It is curious that pottery is not mentioned; it can hardly be urged that although in use it was too unimportant for a place in the inventory, since room is found for one small canvas bag, value 1d.

[2] Hence the name convertible husbandry.

districts, and profoundly influenced home life and the position of women. At the same time both home and foreign trade greatly increased, and "natural economy" was almost entirely replaced by "money economy," the necessities of life being no longer produced by the family for their own use; men worked instead for payment, and then with the money so earned bought in the market the goods they required.[1] These changes, like the corresponding changes at the end of the eighteenth century, brought greater wealth and pomp to some classes, increased comfort to the bulk of the people, but called into existence a new class of landless labourers, whose needs and importunities finally led to the establishment of the poor-law.

It would require a volume to describe how these changes reflected themselves in the daily life of the people, and at present I must content myself with noting very briefly the main effects of this first industrial revolution.

In the country two classes appeared: the labourer, who, although he might possess a small piece of land of his own[2] or at the least had grazing rights over a neighbouring common, yet

[1] This is, of course, a very summary statement of changes which it took centuries to bring about. On the one hand, money economy existed in the mediæval town; on the other, subsistence farming continued in England to some extent until within a hundred years ago. Yet it is roughly true that in the fifteenth and sixteenth centuries production for the market and not for use markedly and suddenly increased.

[2] By an Act of 1589, it was ordained that four acres of land should be attached to every cottage. *Cf.* Hasbach. "English Agricultural Labourer," p. 40.

depended for his livelihood on the wages paid by his master. So far I have not discovered any reliable source of information with regard to the family expenditure of this class.[1]

Next there was the farmer either renting or owning a farm. Very often farming would be combined with spinning or weaving wool. Agriculture of this kind, partly for subsistence and partly for the market, supplemented by the practice of domestic industries, remained the dominant type in England until the introduction of capitalist farming in the eighteenth century, and indeed can still be found in backward districts. The part played in it by women can be illustrated by a curious account of the duties of the wife of a husbandman given in Fitzherbert's "Book of Husbandry" (1534).

"First in a morning when thou art waked and purposiste to rise, lyfte up thy hands and blesse thee . . . And when thou art up and redy, then first sweep thy house, dress up thy dysshe-board, and sette all things in good order within thy house. Milk thy kye, suckle thy calves, sye up thy mylke, take up thy children and array them, and provide for thy husband's brekefaste, dinner, souper, and thy children and servants, and take thy part with them. And to ordayne corn and malt to the myll, to bake and brue withal whanne need is. And meete it to the mill and fro the mill, and see that thou have thy measure again

[1] See Cunningham, "English Industry and Commerce," vol. ii. p. 40 (4th ed.).

beside the toll or else the miller dealeth not truly with the or els thy corn is not drye as it should be. Thou must make butter or cheese whan thou maist, serve thy swyne both morning and evening, and give thy poleyn[1] meat in the morning, and when tyme of the year cometh, thou must take heed how thy duckes henne and geese do lay and to gather up their eggs and when they wax brodie to get them. . . . And in the beginning of March or a little before is time for a wife to make her garden and to gette as many good seedes and herbes as she can and specially such as be good for the potte and to eat. [Then come lengthy and technical directions for sowing and working up flax and hemp] and thereof may they make shetes, bordclothes, towels, shirts, smocks and such other necessaries and therefore let thy distaff be always ready for a pastime that thou be not idle. . . . It is convenient for a husband to have shepe of his owne for many causes, and then maye his wife have part of the woll to make her husband and herself some clothes. And at the very least way she may have the locks of the sheep either to make clothes or blankets or coverlets or both. And if she have no wool of her own, she may take wool to spyn of cloth-makers and by that means she may have a convenient living . . . It is a wife's occupation to wynowe all manner of corns, to make malt, to wasshe and wrynge, to make haye, shere corn, and in tiyme of nede to help her husband to fyll the muck-wain or dung-

[1] Poultry.

cart, drive the plough, to load hay, corn or such other. And to go or ride to the market, to sell butter, cheese, eggs, chekyns, capons, hennes, pigs, geese, and all manner of corns, and also to bye all manner of necessary things belonging to the household and to make a trewe reckoning and account to her husband what she hath paid. And if the husband go to the market to bye or sell, as they oft do, he then to show his wife in like manner."

It is interesting to note in this extract the mixture of natural and money economy, the appearance of domestic manufactures, and the energetic co-operation of the wife in the work of the farm. The sixteenth century would have had little sympathy with the sentimentalists who hold that womanhood in itself is a burden so heavy that all active occupations should be forbidden to the married woman.

According to Harrison[1] the standard of comfort among the agricultural classes rose markedly at this time. Chimneys became common, pewter plates and silver or tin spoons are used in place of "tinn platters and wooden spoons." A farmer thinks his gains very small "if he have not a fair garnish of pewter on his cupboard, with so much more in odd vessels going about the house, three or four feather-beds, so manie coverlids or carpets of tapestry, a silver salt, a bowl for wine if not a whole nest, and a dozen of spoons to furnish up the suit."

[1] "Description of England," p. 238 *ff.*

Food, too, according to Harrison, was plentiful and varied. The increase in pasture farming and the decrease in arable land had made meat (often, it is true, salted) cheaper and corn-stuffs dearer, at least in proportion. This tendency can be traced in the menus and accounts of the period, and certainly appears in the following extract:[1] "The artificers and husbandmen make greatest account of such food as they may soonest come by and have it quickliest ready. Their food also consisteth principallie in beef and such meat as the butcher selleth; that is to saie, mutton, veal, lamb, pork, whereof he findeth great store in the markets adjoining, besides souse,[2] brawn, bacon, fruit, pies of fruit, fowles of sundrie sort, cheese, butter, eggs." A little lower down he notes that venison and a cup of wine are luxuries reserved for special occasions.

It is not easy to estimate the worth of Harrison's testimony to the social habits of a class which he did not probably know intimately. It is certain, too, that he was not speaking here of the poorest class of labourers,[3] those who later recruited the class eligible for poor-law relief. But even making these admissions, his words seem to be evidence of a standard of comfort higher in some respects than could be attained by the corresponding classes to-day. Chicken, for instance, practically never forms part of the dietary of even the well-to-do urban artisan of the present time.

In the organisation of the wealthy household,

[1] *Op. cit.*, vol. i. p. 150. [2] Pickled pork.
[3] This class is never described by him.

the economic changes of the time produced important alterations. The increase in buying and selling made the landlords more anxious to dispose of their surplus produce in the markets, and on the other hand provided new luxuries on which money could be spent. There resulted a tendency, which can be traced in all the household books of the period, to limit the numbers of servants and retainers. At the same time there was a growing desire for privacy, and a widening gulf between the upper and the lower classes of society. Hence the hall, the general assembly-place for the entire household, lost its importance ; dining-rooms and withdrawing-rooms for the exclusive use of the family and guests, took its place, and the servants were relegated to their own part of the house. Partly as cause of this, partly as effect, domestic administration ceases to be a career for men of better social rank, a tendency which would of course be intensified by the fact that in commerce, in literature, in exploration, &c., new opportunities were perpetually being opened up. Hence Elizabeth's reign is a turning-point for the history both of domestic service and of domestic architecture. It was probably about this time that women superseded men as cooks and cleaners, and it is certain that the increase in Elizabeth's reign of industries worked for profit must have diminished the production for use in the household of many articles of common domestic utility.[1]

[1] See Cunningham, ii. p. 78, "Issue of Patents for making Soap and Vinegar."

(2) *Life in the Stuart Period*

For 150 years after the death of Elizabeth no startling changes occur in the organisation of the household or in its economic relations. The marked feature of this period is the existence of domestic manufactures, engaging the head of the household and his family, one or two apprentices, and sometimes a journeyman or two. It was common, indeed all but universal, for the small master manufacturers to board and lodge their employees, as it was common for farmers to board and lodge their labourers. The larger households carried on at home many of the operations—baking, brewing, washing, jam-making—which have now passed to the factory. There was a steady growth of domestic luxury and of convenience. The development of commerce made available new commodities, such as tea, coffee, cocoa, and thereby influenced social life. Furniture became more elegant, and perhaps at the same time more stuffy.

It would require much reading and research to elaborate the details of this progress, and for our present purpose it is hardly necessary, as it involved alteration in particulars but not in the general organisation of household economy. The difficulties of finding domestic servants begin, however, to make themselves felt, and are amusingly discussed by such writers as Defoe and Swift. It is at some time during this period that houses are first built in terraces and squares on

an identical plan for letting purposes. But there are no sweeping changes, such as mark the eighty years before the accession of Victoria.

(3) *The Influence of the Second Industrial Revolution on the Home*

In the last half of the eighteenth century agriculture and industry were once more revolutionised, the former by the introduction of capitalist farming, the rotation of crops, and the further enclosure of common fields, commons, and wastes, the latter by the introduction of machinery and mechanical motor power. For a detailed account of the enormous changes consequent on these new methods of production, I must refer the reader to the special treatises on the subject,[1] but we must spend some time in considering the ways in which the home, family life, and the position of women have been modified by these industrial developments.

In the first place, the introduction of machinery meant the growth of the factory system, and in consequence work left the home, which ceased to be the institution where productive industry was carried on, and became instead a centre solely of emotional and domestic life. At the same time, the alteration in the land system made it impos-

[1] *e.g.* Slater, "English Peasantry and the Enclosure of the Common Fields." Hasbach, "History of the English Agricultural Labourer." Toynbee, "The Industrial Revolution." Hobson, "Evolution of Capitalism."

sible any longer to combine home weaving, spinning, &c. with subsistence farming ; the worker becomes an employee in a business where the capital is owned by his employer, and he depends absolutely on the skill of his own hands for his livelihood.

Nothing could be more curious than to contrast Defoe's celebrated picture of the wool-weaving districts of Yorkshire[1] with those districts in their present condition. Then the workers, semi-independent, farming small enclosures of two to six or seven acres, laboriously produced cloth by hand processes in their own houses. Now they work in enormous factories, fitted up with machinery which can spin and weave wool both easier and better than in earlier days. They return to their homes for rest and leisure alone. Work for wages and the home are now separated, and, unless the use of cheap electrical power brings about a counter-revolution, are likely to remain so. At the same time, since mobility is in modern

[1] [Near Halifax]. "After we had mounted the third hill, we found the country one continuous village . . . hardly a House standing out of speaking distance from another, and as the day wore on we could see at every House a tenter, and on almost every tenter a Piece of Cloth, Kersey or Shalloon, which are the three articles of this country's labour . . . Then as every clothier must necessarily keep one horse at least to fetch home his wool and his provisions from the market, to carry his yarn to the spinners, his Manufacture to the fulling mill, and when finished to the market to be sold and the like ; so every one generally keeps a cow or two for his Family . . . Nor is the industry of the people wanting . . . Though we met few People without Doors, yet within we saw the Houses full of lusty fellows, some at the dye-vat, some at the loom, others dressing the cloths, the women and children carding or spinning. All employed from the youngest to the oldest. Scarce a thing above four years old, but its hands were sufficient for its own support." Defoe, "Tour through Great Britain" (1769), vol. iii. p. 146.

economic conditions of prime importance, it is becoming less and less common for the manual worker, or indeed for the citizen of any class, to own his house, and therefore the new trade of the speculative builder comes into existence, its place being taken in some cases, specially in mining districts, by the "company" houses provided by masters for their employees.

These alterations in the framework of society inevitably influenced home life, which was still further affected at a later period by an analogous movement. Not merely the work done for wages left the home, but also many of the commodities formerly produced for its own use by each household came to be made by outside labour.

A very interesting and quite untouched field of inquiry here awaits the economist. Why, for instance, is it customary to bake bread at home in some districts and to buy it from a shop in others? Probably the explanation is to be found in the relative cheapness of fuel. Yorkshire and the North of England are close to abundant coalfields, and in the days before cheap and quick transit the difference in the price of coal in the South and North of England must have been even greater. At a time, too, before the improvement of ovens, owing to the introduction of the iron range and kitchener, the amount of fuel used for baking bread would be even larger than at present. Therefore in the south there grew up a race of housekeepers and servants unskilled in the making of the delicious, crusty home-baked loaf, while in

the north, even though conditions have changed, the tradition still remains, and the weekly or bi-weekly baking day is a regular institution. But this theory does not explain why bread is not baked at home in Scotland, even in Glasgow and the districts near it, or in Fife, which are all situated right in the coal-bearing areas.

And at present there is little material for describing how brewing, jam and cake-making, biscuit-making, the making and the washing of clothes, the cleaning of furniture and carpets, &c., passed from the household to the factory and laundry. It is a process which has evidently been much quickened by the growth of town life, itself one of the most important effects of the industrial revolution.[1]

The aggregation of population in towns in the first place made the space available for household operations much smaller than was the case when the kitchen was supplemented by rows of out-houses, a green and a garden. In modern conditions, washing at home results in the discomfort of the whole family, whether that family lives in a single room or in a decent middle-class house of ten or twelve rooms. In the second place, the

[1] "The increase of urban areas can be gathered from the Census Reports. In 1851 . . . the population of such areas amounted approximately to 9,000,000, or 50 per cent. of the total population of England and Wales; by 1881 the population of urban sanitary areas, as defined by the Public Health Acts, 1872 and 1875, was 17,600,000, or 68 per cent. of the aggregate population; by 1901 . . . the population of boroughs and urban districts amounted to 25,000,000, or 77 per cent. of the aggregate population."—Blue Book on Public Health and Social Conditions, p. 6 [Cd. 4671 of 1909].

massing into a comparatively small area of a homogeneous population makes it easy to arrange for other methods of cleansing clothes, either in the working-class districts by the provision of municipal washing-houses, or in the more well-to-do suburbs through the appearance of steam laundries. In the same way, when each household possessed a garden it was natural to pick the fruit and make it into jam. It is a different thing to buy fruit specially for the purpose. Many housewives find that when the cost of the fruit, sugar, and extra fuel is calculated, taking into account also the dislocation of the regular routine of the household caused by the extra work, it pays them better to buy the jam ready-made. On the other hand, the use of machinery, the existence of cheap methods of transit, and the multiplication of grocers' shops makes it increasingly possible to produce jam in large quantities actually cheaper than it can be made at home, and to distribute it quickly to the consumer.

The same cause, acting within and without the home in different ways, is resulting in a steady transference of these domestic avocations from the household. Moralists often lament this tendency, and attribute it entirely to increased love of ease and leisure among women. But it is no more possible to draw an indictment against a whole sex than against a whole people, and an alteration in custom so widespread as this which we are discussing must have deeper roots than a personal defect of laziness in particular individuals.

This removal of production for domestic use from the home operates, however, in very different ways in different cases. Sometimes the article is produced much more cheaply outside the home than within, owing to the lower cost and greater efficiency of large-scale methods of manufacture. But this is not invariably the case. Laundry-work, for instance, is probably done more cheaply in the private household. The few attempts hitherto made to provide hot cooked food from a central kitchen at a reasonable price have not been successful. On the other hand, no individual household could hope to rival Messrs. Huntley & Palmer as producers of biscuits. The factors which prevent the full economies of the large-scale method of production from being realised in the making of certain commodities are twofold. (1) Some goods are of such a kind that they must be consumed where they are produced. Jam or even plum-puddings can be made in a factory in the North of England and afterwards transferred to London. But roast beef, omelettes, and rice-puddings must be eaten within at least a hundred yards of the place where they are cooked. This obvious fact effectually retains the supremacy of the home in the provision of hot cooked food, and disposes once and for all of the cruder arguments for co-operative housekeeping. (2) Certain commodities must be made for or returned to individual owners. If, for instance, we did not trouble to receive our own sheets and towels from the laundry, but simply made a con-

tract that each week we should be supplied with a certain number, then the washing and sorting could be done wholesale at a much cheaper rate. If we sent our own fruit to the factories to be made into jam, jam would be much more expensive.

Thus the household will compete successfully with outside agencies, in the case of all commodities which must be consumed on the spot, and the outside agencies will have only a small advantage—will do the washing or dressmaking more conveniently, but not much cheaper—when wholesale methods are forbidden by the personal interest of each consumer in one special portion of the commodities dealt with.[1]

Still, regarding the matter from the general economic standpoint, it cannot be denied that the result of the industrial revolution has been to transfer many branches of production both for profit and for use from the home to the factory.

(4) *The Position of Women as Affected by the Industrial Revolution*

This in its turn affected the position of women, and is probably, if not the sole, at least the most important reason for the discontent and unrest to be traced among women of many different classes in the nineteenth century. But the women be-

[1] It should be noted, too, that the advantages of the large-scale method of production are greatly diminished by the dangers of adulteration. *Cf.* p. 177.

longing to the manual labouring class and the women belonging to the upper classes were influenced in different ways.

The former had always been accustomed to work for their living, indirectly if not directly. On the little farms they looked after the cow, the hens, and the garden. They did the carding and the spinning of flax and of wool. True, these industries were carried on at home, and probably the decent "manufacturer," then literally a hand-worker, would have regarded himself as disgraced had his wife or daughters needed to go outside his home to find work.[1] But when the factory system came, with the horrible sufferings caused by the transition from one system of industry to another, the women and children always accustomed to toil at home followed their work to the factory, and there, owing to the new methods of competition and to the absence of any regulation of industry, they suffered hardships of overwork and underpayment which seem to the present generation nearly incredible.

Home life for a time almost disappeared, and the suffering and degeneration was only checked by the series of Factory Acts, imposing ever fresh and fresh restrictions on the treatment of women

[1] In the absence of an efficient system of police, it probably was not safe for women to walk or travel alone. In the security provided for us by paved and lighted streets, guarded by trained constables, and in the complete safety of modern methods of travelling, some of us are apt now to forget these elementary considerations, once of supreme importance.

and children.[1] The policy underlying these acts was much criticised at the time, and was indeed not fully comprehended until recently. But it is now all but universally admitted that the Factory Acts have in the main achieved their object, and have greatly improved the position of women in the districts most affected by them ; and reformers are constantly urging their extension to fresh trades.

This movement was not understood, and was in consequence opposed by the women of the middle-classes, whose position was affected quite differently by the industrial revolution. They too found their occupations within the home to a large extent destroyed. And in other ways their situation was altered. For some reason not yet explained, there appeared in the middle-classes a surplus of women. This is no doubt partly due to the colonial expansion of the period, which sent young men out to Australia, Canada, and South Africa, while their natural mates remained behind in England. It is not easy to give precise statistics, as our statistical tables make no distinction of classes, but common observation and the description of social life in the novels of the nineteenth century afford evidence of this fact. Some statistics bearing on the subject can be found in Miss Clara Collet's [2] article, "Prospects of Marriage for Women," and also in "Die Frauenfrage," by

[1] For the whole subject, see Hutchins and Harrison, "History of Factory Legislation."

[2] In "Educated Working Women," by Clara E. Collet, 1902. Miss Collet says: "Were statistics available it might perhaps be shown that the unmarried women are to a large extent the daughters of clerks and

Lilie Braun, pp. 157 *ff.* Frau Braun, whose book is marked throughout by characteristic German thoroughness, sums up:[1] "Es hat sich gezeigt, dass die Zunahme der allein stehenden Frauen, die Abnahme der Heiratsfrequenz und die wirtschaftliche Not als Ursache der Frauenbewegung in aller Lände anzusehen sind."

But it was not merely the decreased chance of marriage which made the lives of middle-class women difficult in the last century. There was also a change in the position of the fathers, which decreased their opportunity for providing for their unmarried daughters. The middle-class man is now less and less frequently at the head of a business of his own, and is more and more frequently a salaried clerk, manager, or engineer.

Formerly the shop or farm when it passed to the eldest son was burdened with the charge of the spinster sisters, who often would help in the dairy or behind the counter. Now, when a middle-class man dies, his hold on the industrial world, so to speak, passes away with him, unless he has been at once able and willing to lay by savings out of his salary, a duty too often neglected. Briefly, therefore, the unmarried woman of the middle-classes is less likely to marry, has less to occupy her at home, and

professional men . . . Emigration is probably more frequent in the salaried class; and where the sons are obliged to emigrate, it frequently happens that the daughters have to work for their living. In this class I believe the inequality of the sexes is greatest and the chances of marriage least" (pp. 37–38).

[1] P. 171.

cannot so easily be provided for by her father if she remains a spinster.

Is it then to be wondered at if women insist, in increasing numbers, upon a thorough education as well as the right to enter a profession in which they can be self-supporting ?[1] But the first women who decided that a way must be opened by which they could earn for themselves honourable maintenance not unnaturally fell into what we cannot but regard now as regrettable mistakes, however unavoidable these errors may have been at the time. Their great difficulties were to win admission to the universities and permission to practise what had hitherto been regarded as men's professions. Therefore they dreaded all restrictions liable to be laid upon the entrance of women to occupations, and were led in consequence to oppose the Factory Acts, designed for the protection of women of the working-classes. It is only to-day and only partially that the woman teacher, doctor, or journalist has come to understand

[1] I cannot refrain at this point from inserting the following quotations from "Shirley" (chapter xxii.). Charlotte Brontë's genius illumined the situation of many girls even in her time, and of a larger number since. Caroline is speaking. "Old maids, like the houseless and unemployed poor, should not ask for a place and an occupation in the world ; the demand disturbs the happy and rich ; it disturbs parents. Look at the numerous families of girls in this neighbourhood. The brothers of these girls are every one in business or in professions . . . their sisters have no earthly employment but household work and sewing. . . . Men of England ! look at your poor girls, many of them fading around you, dropping off in consumption or decline ; or, what is worse, degenerating to sour old maids, envious, backbiting, wretched, because life is a desert to them ; or, what is worst of all, reduced to strive, by scarce modest coquetry and debasing artifice, to gain that position and consideration by marriage which to celibacy is denied."

that the position and problems of the factory-hand are very different from her own, and that confusion is created if she insists on judging them from her own standpoint.

In the next place, they were almost forced to become masculine and aggressive in their manners and outlook upon life. In particular, the need of conformity to a system of education framed for men and not for women led to an undervaluation of domestic pursuits. It was not realised that in managing a household and in bringing up children there was scope for the most developed character and the finest education.

But with the twentieth century,[1] college-trained women themselves are coming to see that their previous neglect of those principles of science and economics which underlie household administration was unwise and unwarranted. Of that change of attitude, the new courses in home science at King's College are the firstfruits, and this book is a small contribution to a movement which is destined, perhaps, to revolutionise housekeeping, as a band of devoted women succeeded some few years since in revolutionising the profession of nursing.

The main lines on which the influence of the industrial revolution on women's position has operated can be but briefly indicated in this very

[1] I am not suggesting here that the pioneers of women's higher education were wrong in the attitude they adopted. To win for women intellectual freedom was the most important duty for them, and that could only be achieved by women submitting to the same intellectual tests as men. But the problems which call for solution by their successors of a later generation have assumed a new form.

summary sketch. Want of space prevents me from doing more than allude to other aspects of the question, such as the employment of married women, the status of women in government offices, women's trade unions, homework and sweating, the prevention of infant mortality, the work of women in the administration of charity and in local government, together with many other developments of the one cause—the alteration between the relations of the home and of society due to the changes in our commercial and manufacturing system.

I must turn now to a study of the economics of the household as it actually exists to-day.

II. THE PRESENT ORGANISATION OF THE HOUSEHOLD

To begin with, it is perhaps worth while to notice certain broad distinctions which differentiate the household, considered merely as an economic institution, from other agencies engaged in the production of commodities and services.

One main difference is, as was noticed earlier, that the household produces use-values, and all other organisations (save some public bodies) exchange-values. Or to put the same thing in another way, the industrial world is run to make a profit; the household, on the contrary, is kept up by the contributions of its members, and exists to provide for them the necessaries and comforts of life. None the less is the work of cooking, cleaning, and serving of real economic value

when carried on within the household, as people discover when they have to pay for the organisation of the same services in hotels or boarding-houses.

The second great distinction is that while any other business may expand to meet the demands of a growing market, and as a result of the increasing competency of its organiser and work-people, the household is definitely limited in scope by the numbers of the family included within it. Biscuit-makers or jam-makers, to put the matter concretely, may succeed by skilful management in enlarging their businesses until they supply their goods to hundreds of thousands of people, and earn a large profit by doing so. But the most efficient housekeeper continues all her life to organise and cater for the same number of people, and her reward for her good management does not consist in a raised salary or increased profits. It is, in fact, not pecuniary at all, but is the increased well-being of those whom she serves.

Important consequences follow from these two distinctions, some of them desirable, others the reverse. The household is preserved, as it were, as a little oasis in the midst of the surrounding commercialism. There at least exists no temptation to adulteration or sophistication, or to shoddy work intended to sell but not to last. No housewife would be such a fool as to put alum in the bread baked at home, to use decaying fruit in the tarts, or questionable meat in her pies. She can

have no object save to provide the best she can for her family with the means at her disposal. This is an enormous advantage, the value of which it is hardly possible to overrate.

But the absence of profit-making has certain disadvantages. It means that while other economic organisations are being constantly spurred to increasing efficiency by the stimulus of competition, the household remains backward. A manufacturer knows to-day that he must use the most up-to-date machinery and employ the most skilled management or be beaten in the race for commercial supremacy. But housekeepers may continue (and do continue) to use old-fashioned ranges or antiquated systems of hot-water heating without any reference to the proceedings of their neighbours. Without doubt it results that new inventions make their way much more slowly in housekeeping than in profit-making industry. How rare, for instance, it is to find properly constructed grates outside very wealthy households. How badly the kitchen, larder, and scullery are planned in relation to one another. In how few cases is any attempt made to utilise electricity for cooking or removing dust, for both of which purposes admirable machines are already on the market.

But there are other factors which also contribute to the backwardness of domestic engineering. The smallness of the household is one. It pays a large hotel, for instance, to buy special machines for cleaning knives, or to instal superheated steam

for washing plates and dishes. But neither the initial expense nor the cost of running could be met out of the funds at the disposal of the small household. Another reason exists in the fact that the average housewife does not distinguish between annual and capital outlay. Unaccustomed to finance, and keeping accounts—if she keeps them at all—in a very amateurish fashion, she fails to understand that capital expenditure, let us say, on one of the little electric vacuum cleaners now on the market might pay for itself in a short time by saving the wages of a charwoman.

(*a*) The Organisation of the Household as Affected by the Housing Question

Then, finally, few people own their houses, and are therefore disinclined to make an outlay which would benefit their successors rather than themselves. Landlords (who are frequently retired tradesmen or elderly ladies depending on the rent of a row of houses for their sole income) are in their turn unprogressive and unenlightened. It is often hard to induce a landlord of the type indicated to consent to structural changes even if carried out at the tenant's expense. The builders of new houses, again, are not, to put it mildly, educated in the best schools of household architecture and domestic engineering. It is true that in some suburbs, largely under the influence of the more competent architects employed by the garden city organisations, a marked improvement in domestic

building is noticeable. But only too often the hot-water system is inefficient, the ventilation poor, the grates wasteful, and so on. I have never yet heard of a speculative builder who deliberately planned the laying out of the streets in the area which he was developing in such a way that the living-rooms might have a maximum and the larder and pantries a minimum of sunlight. The new roads are usually all set at right angles to the main street, and the houses rigidly planted square to the roads, regardless of the points of the compass.

All these factors, acting together, prevent that general improvement in the construction of houses which is noticeable in other branches of industry. Progress does, of course, take place. The pressure exercised by the local health authorities leads to improved drainage and plumbing; lighting, owing to the recent competition between gas and electricity, has become both cheaper and better. But an intelligent application of science and investment of capital when a house is under construction could easily effect still further improvements.

Since, however, the household is not influenced by the ordinary processes of competition, advance will probably depend on some form of co-operation among tenants. The principle of tenant co-partnership has hitherto been applied only to the construction of working-class houses, but there seems to be no reason why it should be not equally useful among the middle classes. The advantages of the organisation are that it secures to the tenant a well-built house, sometimes

specially constructed to meet his wishes, while his complete mobility is not interfered with as it is by ownership of his dwelling. These apparently opposed results are obtained by the formation of a company which is the legal owner of the land and the houses ; but no one is allowed to rent a house until he invests a certain amount of money in the company. Thus there are two classes of shareholders—tenant shareholders and ordinary shareholders. If a man wishes to move from the neighbourhood, then he ceases to be a tenant and becomes only an ordinary shareholder, and if he needs the money he can always sell out. Rent is paid in the ordinary way, and so too are dividends on the shares. Thus groups of people are enabled to control the conditions under which they are housed, without being hampered by the possession of a dwelling-house, which in an emergency they may be forced to sell at a serious loss. Minor advantages are greater cheapness of construction owing to wholesale buying of materials, and the provision of a more liberal repair fund than is contemplated by the ordinary landlord. It is possible, too, to provide common tennis courts, children's playgrounds, pleasure gardens, &c., which are kept up out of the general funds of the company.[1] The "co-partnership tenants'" villages at Bournville, Hampstead, Ealing, &c., are all doing well,[2] and we may venture to hope that if

[1] See Raymond Unwin, "Housing and Town-Planning."

[2] In June 1908, the value of the property of the various tenants' companies was only a little short of a quarter of a million pounds, and their operations have since then been extended in various directions.

the same principle were applied to the housing of the middle classes, the worst horrors of the dreary and yet pretentious suburbs constructed by the speculative builder would soon be checked.

(*b*) The Problems of Domestic Service

The position of the domestic servant is the next subject which demands consideration. It is a question which has aroused much acrimonious controversy, mistresses accusing maids of ignorance and inefficiency, maids objecting in their turn to the menial position and lack of freedom involved in domestic service. Yet it is curious to notice that the conditions of this branch of work have been little studied by the economist. The number of domestic servants as enumerated in the census of 1901 was 1,330,783, the largest single occupation in the country.[1] But while dozens of books and blue-books could be named discussing the position of the textile worker or the agricultural labourer, not more than three or four investigators have concerned themselves with the domestic servant, on whose efficiency our health and comfort absolutely depend.

Another curious anomaly is that domestic servants are becoming fewer in proportion to the popu-

[1] For comparison :—

Occupation.	Number of Persons Employed.
Agriculture	1,197,922
Textile fabrics	1,155,397
Professional occupations	606,260

lation, although the level of their wages is very high in comparison with the usual payments for women's work. Between 1881 and 1901 female indoor servants increased from 1,230,406 to 1,330,783, an increase of 8.2 per cent., while the population increased 25.2 per cent. Actually, then, there was a smaller proportion of the population engaged in domestic service in 1901 then in 1881.[1] What is still more remarkable is that at the younger ages the number has actually decreased. Between the ages 15–20, there is a decrease of 7.3 per cent., while in the number of females living at those ages there is an increase of 28.1 per cent. This suggests that the difficulty of finding servants will intensify as time goes on, as is indeed borne out by observation. Other women's industries are growing very rapidly. The number of female clerks more than trebled between 1891 and 1901. In the same period, female elementary school teachers increased by over 50 per cent., and the women engaged in hospital and institution service and in workhouses and workhouse infirmaries by 41 per cent. These facts indicate that domestic service is becoming less and less popular and is losing ground, while other women's industries are gaining.

It is our duty then to consider the causes of this state of things, which cannot be regarded with equanimity. Our steadily increasing wealth ought to make it more and more possible and

[1] Owing to a change in the system of enumeration which alters the basis of comparison, the year 1891 cannot be used in our calculations.

desirable for more women to specialise in those basic industries of cooking and cleaning, which are of the utmost importance for the right ordering of life.

The question must be treated in reference to the general industrial and social changes of our time. Many ladies, knowing nothing of economics, discuss the matter as one of personal relations only, and when they find themselves annoyed with one incompetent servant after another, content themselves with blaming the servants as individuals without inquiring whether the difficulty has any deeper root. Or they take up a reactionary attitude, and declare that the lower classes are over-educated and too well off, and are in consequence refusing to perform their natural duties. But neither personal blame nor the semi-feudal belief that the one and only rightful destiny of daughters of bricklayers, coal miners, or small clerks is to become cooks or housemaids in the service of their betters will avail to throw any light on the difficulty of obtaining competent domestic workers. We must study carefully and without bias the conditions of that industry as compared with other industries, in order to solve the problem.

In the first place, we may note the advantages of domestic service. It is, as has been already observed, well paid. Some investigations carried out by a group of my students last year led to the conclusion that the ordinary cook, housemaid, or general servant in middle-class households costs her employer in wages, food, house-room, heating,

lighting, and insurance about £50 a year.[1] I have been informed by a lady accustomed to deal with servants in a wealthy household, that board wages are usually 14s. 6d. for men servants, and 12s. 6d. and 10s. 6d. for women servants. When we remember that in the ranks from which servants are drawn,[2] a workman is comparatively well off if he is earning 35s. a week for the support of himself and his family, and that a woman who makes £1 a week is a rarity,[3] we should expect to find domestic service one of the industries in which the supply outruns the demand. Again, there is no period of apprenticeship or training necessary. The servant earns from the first day she enters service, and is often carefully trained by a mistress in cooking or waiting at table, only to leave that mistress for a better situation the moment she thoroughly understands her duties. Again, in many households the maids share in the family holidays. They spend a month at the seaside or in the country, having all their travelling expenses paid as a matter of course. Their allowance of personal holidays may not be large, but at all events their wages run on without

[1] The competent single-handed maid is meant here, not the little "slavey" who assists her mistress in the rougher part only of the work.

[2] A further inquiry is needed into this matter. I am not at all clear whether servants are derived from the class of the fairly prosperous artisan or from the unskilled labouring class.

[3] "There are unfortunately no reliable statistics as to the average wages earned by women workers, but, speaking from a large experience, I estimate that the average wage of the manual woman worker, taking into account slackness, sickness, &c., is certainly not more than 7s. 6d. all the year round."—"Trade Unions," by Mary Macarthur, in "Women in Industry from Seven Points of View," p. 66.

interruption. These advantages are the more remarkable, when it is considered that they have been attained without the aid of any trade organisations at all. Trade unions for domestic workers have been formed from time to time, but their life has been ephemeral and their membership of the smallest. High wages, practically continuous employment, food and lodging usually of a standard much above that in the servant's own home—all these are to be found in domestic work. Why, then, does it remain unpopular ?

In the first place, the hours are long and irregular. A domestic servant, especially in a place where only one or two are kept, is "on duty" for at least fifteen hours a day—from 7 A.M. to 10 P.M. Even meal-hours are not free from interruption. The thoughtful mistress, it is true, will not summon her maids at dinner-time or supper-time if she can help it, but all mistresses are not thoughtful, and in any case there is the door-bell to be answered. Much of the work is not hard ; in a well-managed household there should always be an hour or two of comparative leisure in the afternoon and again in the evening. But the average maid is never sufficiently free through the whole day to go out without asking leave, or to lie down for an hour should her morning work have been unusually heavy. Of some households a much blacker picture could be painted. Not merely do the maids have no leisure, but they are actually hard at work washing, cooking, ironing, serving meals, washing up, carrying

coals and hot water, &c., for even a larger period than the fifteen hours which, as noted before, is the minimum of time "on duty." These hours compare very unfavourably with the six or seven hours' day of the elementary school-teacher, the eight hours' day of the Civil servant, and the nine or ten hours worked in factories and in offices.

Next, there is the lack of personal freedom. This may seem a mere sentimental objection not to be weighed in the balance for a moment by sensible persons as against the solid advantages of domestic work. But sentimental objections count more decisively with women than with men. Miss B. L. Hutchins points out in a recent article that respectable girls of the working class often accept quite low wages, provided only their employment is light, clean, comfortable, and affords abundant hours of leisure. And women enter on domestic service exactly at the age at which freedom and some amount of leisure seem more valuable than high wages. Doubtless in later years many sweated drudges have wished that they had become servants instead of entering the jam-factory or the steam-laundry. But at sixteen and seventeen, when the choice was made, the situation appeared very different. I have very little doubt that one of the greatest objections to domestic service is that it removes the young woman from her own class just at the marriageable age, and therefore decreases her chances of marriage, while in some ill-governed households and in hotel and restaurant service she may be subjected to severe

temptation. The widening of the gulf between rich and poor and their segregation into distinct districts increases this disadvantage.

Again, there is the fact that domestic service is strangely enough regarded as a peculiarly menial occupation, in itself a mark of a lower social grade. This is indicated by the use of the Christian name, the insistence on a uniform, and the commonness of contemptuous terms such as "slavey." Refined people are careful to avoid the use even of the word "servant," replacing it by "maid," so strong is this connotation of inferiority. Here again we are on sentimental grounds. But it certainly seems undesirable, in view of the spread of doctrines of social equality, that this suggestion of a low social status should cling around the person who undertakes such important duties as cooking and washing.

Another disadvantage is the loneliness of domestic servants. In other occupations women have colleagues and companions. The general servant, coming as she does from a lively even if poor working-class home, with neighbours at hand for gossip in moments of relaxation, may find it very hard to bear up against the restraint and unnatural quietude of her first place,[1] and often ends by returning in haste to the factory industry she had been persuaded to abandon, when she will find the gaiety and lively society of girls and young men of her own age. Even when two maids are

[1] Stephen Reynolds in "A Poor Man's House" paints this situation with great psychological insight.

kept, they may not be congenial to one another, and one cannot deny that to share work, meals, and often bed with a woman whom one has reason to dislike, is a fate we would all wish to avoid.

Girls of higher status and more intelligence are often turned from domestic service by the fact that it affords little or no opportunity for self-improvement or recreation, or for promotion inside its own ranks. Servants cannot go to lectures or evening classes. The servant's piano or bicycle is a common theme for jesting in the comic papers. In a large household or in a hotel promotion may be obtained, but the maid who becomes a general servant or a single-handed cook reaches the limit of her increase in income at an early age.

Many of the disadvantages noted do not apply to large households. There companionship is to be found, and promotion may be looked for. The hours are more regular, meals less interrupted, and free time easier to obtain. Hence I was not surprised when I questioned proprietors of clubs, residential hotels, and the mistresses of wealthy households to learn that most of them considered the servant difficulty to be greatly exaggerated. The housekeeper of one suite of residential flats told me she had no trouble at all in getting servants, and that she sent them off at a week's notice if they proved unsatisfactory. "Even if I cannot get a maid to live in at once," she added, "I can always supplement the work of the others by an extra charwoman. There are any number of outworkers to be had." In another residential

hotel all the women servants had two evenings a week free from 5 to 10.30. Here, too, there was never much difficulty in obtaining workers.

Another disadvantage of the small as opposed to the large household is that the management is often inefficient, and the equipment poor. In these residential flats, for instance, each suite had its own bathroom and lavatory, and consequently the work of carrying water was reduced to a minimum. I think, too, that the regularity of the discipline is often liked by girls, who find it hard to keep to good ways when they work alone.

On the whole, then, I see no reason to believe that domestic service is unpopular because cooking and cleaning are regarded as disagreeable occupations in themselves. It is the conditions under which it is carried on that are disliked, and if mistresses desire to have better servants, those conditions must be altered. Some of them, it must be admitted, are inherent in the present organisation of the household.[1] Some form of co-operation might obviate certain of these defects ; in groups of associated homes, the domestic equipment could certainly be improved, skilled supervision and proper discipline could be more easily carried out, and the maids would have the advantages of shorter and more regular hours and of companionship with their equals. Here again it may be possible to apply the co-partnership tenants' organisation. Many people, however, not un-

[1] Compare Salmon, "Domestic Service," pp. 145–6.

naturally dread the lack of privacy and independence which such a mode of life would, they think, entail, and would prefer to endure the disadvantages of the present system rather than lose control over their own kitchen and their own servants. It is too soon yet to express an opinion. Fortunately, at Letchworth, at Brent Lodge, Finchley, and elsewhere, experiments in the provision of associated homes with a common kitchen and a common staff of servants are shortly to be tried. If successful, they will no doubt prove a boon to many people.

In the meantime one can only suggest that mistresses must endeavour individually to mitigate some of the disadvantages of domestic service. It is not higher wages that are needed, but more leisure and more society, and an absence of the foolish snobbery which regards it as an amusing joke that a servant should wish to possess a bicycle or go to a meeting or concert.

The suggestion has sometimes been made that distressed gentlewomen might find a refuge in domestic service. But "lady servants" or "mothers' helps" only rarely prove a success. Their presence is inevitably a hindrance to the full enjoyment of family privacy, and often enough their gentility is an excuse for incompetence. But in special cases lady servants turn out well, especially as children's nurses. The most interesting attempt to introduce them into general domestic service is that started by the Guild of the Dames of the Household at Chelten-

ham. A short period of training is insisted upon, while on the other hand certain privileges not usually conceded to maids must be granted, in particular, a period of two hours each day free from duty. In small and quiet households, specially in those composed of ladies only, a "Dame" would be welcomed in place of the incompetent general servant, or two Dames might take the place of the regulation cook and house-parlour maid. But it would not be easy to have one Dame demanding special privileges and imbued with different traditions in a larger household.[1]

Nor do I see any reason to expect that increased provision for domestic training alone is likely to improve the lot of mistresses who want maids. The training in the elementary schools is often given to children too young to profit by it, and is besides designed rather to enable them to be of use in their own homes than to qualify them to become cooks or housemaids in middle or upper-class households. Again, the girls who attend at the special domestic economy schools are not usually available for ordinary domestic service; the greater number of the students are being prepared either for teaching or for positions as housekeepers and matrons. While untrained girls can find a place and wages without any difficulty, working-class parents are not likely to spend money on training for domestic service; and the

[1] Compare "Englishwomen's Year-book for 1910," p. 69.

numbers for whom scholarships are provided must naturally be limited.

Improvement is much more likely to result from alterations in the condition of domestic service. If, as regards leisure and social status, that occupation could be put more nearly on a level with other women's trades, the outlook would be much brighter, and then training in domestic economy in continuation schools or trade schools for girls from fourteen to sixteen would be valuable.

Failing these reforms, mistresses will probably continue to find themselves obliged to put up with cooks who cannot cook, and housemaids and laundresses who are both ignorant and incompetent. The irk and irritation of living all day long at close quarters with an impertinent and inefficient person, which often severely tries the nerves of the women of the professional classes, will continue. These things are inevitable so long as domestic servants do not choose their occupation because they wish to follow it, but because they have been failures in other directions. Therefore no improvement would be attained by shutting other avenues of employment to women and forcing them back into this. Such a line of action is, of course, quite impracticable, whatever be the difficulties of mothers of families and mistresses of households ; factories, offices, shops, elementary schools and post-offices will continue to offer employment to women. But even if it were practicable it would fail of its aim. Work is only

well done when it is chosen for its own sake, not when it is unwillingly accepted because the worker is fit for nothing else. And a genuine improvement in domestic service can only come about by an alteration in its conditions.

A systematic investigation into English domestic service similar to that carried out in America by Professor Lucy Salmon of Vassar College would be most useful at the present juncture, and may possibly be undertaken by the household economics class at King's College. Professor Salmon issued 5000 schedules to employers and 5000 to employees, and received in all 1744 answers. On the answers received she based the conclusions arrived at in her book, "Domestic Service," which are not dissimilar to those set forth in the preceding paragraphs. Conditions in America are, however, so unlike those in England that a separate investigation for this country would be most valuable.

(*c*) A Discussion of Domestic Budgets

(1) *Working-Class Budgets*

I have left myself very little space for dealing with another important section of household economics, namely, domestic budgets. Unfortunately the material for a satisfactory study of the actual and the advisable division of household expenditure is only abundant in certain classes. There are a considerable number of investiga-

tions into the cost of living among the working-classes.[1] From these it is clear that we must make a very marked line of distinction between the domestic circumstances of labourers and of artisans. The former spend at least from 75 to 80 per cent. of their income on food and lodging alone; yet if the family is of ordinary size and none of the children are earning anything, they are commonly under-nourished and badly lodged. The remainder of the income is devoted to fuel, clothes, savings, insurance, and recreation.

Members of this class commonly wear second-hand clothes, and live in tenement houses, originally built for a wealthier section of the community. It is they who send their children to work at any employment that turns up at the earliest moment allowed by the law. The burden laid on the women of this class is peculiarly heavy. They must work for wages if possible, for every extra shilling adds immensely to the family comfort. Hence they go out charing; they undertake ill-paid home work; and at the same time all the toil of keeping the house and children clean and of doing the cooking and washing falls on the mother. Add to this the fact that if the food supply runs short, then the children and the husband have their share first and the mother

[1] *e.g.* Rowntree, "Poverty: a Study of Town Life"; Liverpoo Economic and Statistical Society, "How the Casual Labourer Lives"; "Study of the Diet of the Labouring Classes in Edinburgh" (published by Otto Schulze & Co., now out of print); Recent Blue-books on the Cost of Living, &c.

takes what may be left. It has been calculated[1] that this class amounts to about one-third of the population, and is the source whence comes the greater part of the pauperism with which the country is afflicted.

The artisan class was found by Mr. Rowntree to comprise about one-half of the working-class population. Its domestic circumstances differ in several respects from those of the class already described. Food and housing were adequate; and, save in the textile districts, the wife commonly remains at home and the children stay longer at school. It is this class that is the backbone of trade unionism and the co-operative movement; it is in fact the true "middle-class" of Britain.

Lady Bell in her book "At the Works" gives a very sympathetic sketch of the home life of the ironworkers of Middlesborough, pointing out that the monotony and narrowness of the lives led by the women and the ugliness of the surroundings of the workers' houses are the main defects from which they suffer. Roughly half their income goes on food, which is plain but adequate. The proportion of rent varies very much from district to district. In York it was 12.8, but in such crowded towns as London and Glasgow it would be higher. There is, however, a surplus sufficient

[1] Rowntree, "Poverty: a Study of Town Life," pp. 117, 298 *ff.*, as to inadequacy of diet of labourer, pp. 235 and 303. Mr. Rowntree's conclusions have been impugned by several critics, and it may be that his dietary standard is too high. But even if it turns out that only a quarter and not a third of the population are in receipt of incomes insufficient for the expenditure necessary to secure bodily efficiency, the fact is serious enough.

for clothing, saving, holidays, and reasonable recreation.

It is conjectured that the excessive expenditure on drink in the United Kingdom[1] must be largely due to this class. But the evidence is insufficient to show whether the labourer or the artisan is the more guilty.

(2) *Lower Middle-Class Budgets*

The next class which should be examined is that made up by the clerks and routine brain-workers. As already noted, there is little or no material available for the study of the budgets of this class. The Economic Club published a few years ago a collection of family budgets, four of which might be taken as illustrating the home life of this important section of the community. From these and from the rather unreliable divisions of income given in some of the smaller women's papers, I have come to the conclusion that food absorbs 30 to 40 per cent. of the income, and rent 15 to 20 per cent. The expenditure on clothing is much more liberal, and I am inclined to believe that the poorer clerks are sometimes insufficiently fed.

It should be noted that in this class the cost of education tends to be borne by the parent and not by the State; no doubt there is here a

[1] Calculated by Messrs. Rowntree and Sherwell to amount to 6s. 10d. per family of the working-class population. "Temperance Problem and Social Reform" (7th ed.), p. 20.

genuine grievance, one, however, which the provision of municipal secondary schools is gradually removing. But a thorough and accurate study of the circumstances of the lower middle-class would be of the utmost value at the present time. It is certain that its needs and demands are to some extent at all events overlooked through the increasing power of organised labour on the one hand and the increasing wealth of the upper classes on the other.

(3) *The Budget of the Well-to-do*

Probably it is in the budgets of these wealthier classes that the reader of these pages will be most interested from a personal standpoint. Under this head there is very little scientifically collected material; but on the other hand the ladies' papers and the housekeeping handbooks afford considerable information of somewhat varying value.

It is in this class that service becomes an important item; it is in this class that the artistic side of life, the enjoyment of physical and intellectual luxury, first becomes possible. In a sense the study of expenditure here is both more useful and more interesting. A fraction of the income would suffice for the satisfaction of the mere physiological needs, and there is a real choice possible in the disposition of the surplus.

Therefore, in the case of these larger incomes, I propose to discuss rather the general principles of expenditure than the statistical facts. The

latter are not thoroughly reliable, and at the same time the circumstances of the class in question are better known to my readers.

The fundamental principle, as Marshall[1] states, is that the marginal utility of each separate division of expenditure should be equal. He means by this that our income should be so distributed that the last sixpence we spend on clothes should yield us the same amount of pleasure as the last sixpence expended on food or on books. And he rightly remarks that to the housekeeper the value of keeping accounts lies precisely in the fact that it makes the application of this principle easy.

If we know exactly how money has been spent, then it is possible to see that expenditure has been wrongly balanced, that impulsive extravagance on hats or on out-of-season delicacies has unduly curtailed the amount spent on holidays, books, or concerts. It is for this reason that itemised tables are more useful to the housekeeper than is the ordinary creditor and debtor method of account-keeping. She should of course be able to present an accurate statement of the money spent and received, but she should not be content with this. She should further show for each quarter the amount spent on rent, food, fuel, &c.

The table appended has been in actual use for some time, and has served on more than one occasion to check expenditure which was unduly

[1] "Principles" (4th ed.), p. 194.

QUARTERLY SUMMARY OF HOUSEHOLD EXPENDITURE

Weeks ending.	Food and Cleaning Materials.	Household Washing.	Service.	Coals.	Gas.	Electricity.	Rent.	Rates.	Garden.	Miscellaneous.	Total.	Guests.[1]	Remarks.
Jan. 9													
,, 16													
,, 23													
,, 30													
Feb. 6													
,, 13													
,, 20													
,, 27													
March 6													
,, 13													
,, 20													
,, 27													
April 3													
TOTAL .													
Weekly Average													

[1] A special charge was made for guests in this household, and the amount received was deducted from the weekly food bill.

increasing. It could easily be modified in various ways. Food could be further subdivided, and headings for dress and other personal expenses could be added. Probably, however, it will be found better to keep one card for the quarterly household expenditure, and others for the personal expenditure of the separate members of the household. The amount of trouble involved is comparatively small, provided that the different items are summed up and entered regularly each week when the household books are examined. If the quarterly cards are then filed in order, they afford a most valuable record of household management in a small and easily handled form.

When deciding on the amount of money to be allotted to the separate items, the first thing to be kept in mind is the necessity of preserving efficiency; and brain-workers ought to remember that thorough mental alertness and competency can only be secured by well-chosen, well-cooked, and daintily served food, by sufficiency of sleep, by frequent intervals of rest and recreation, and by thoroughly invigorating holidays. Extravagance should of course be avoided, but the journalist or scientist who is niggardly of expenditure on these items will probably later on be obliged to spend his savings on doctor's bills or a rest cure. A high standard of comfort and efficient work is the cheapest way of living in the long run. Whether, however, all the conventional necessaries now included by custom in the upper middle-class expenditure are really essential to the brain-

worker's standard of life is perhaps another question.

The "simple life" which consists in doing without all the conveniences of civilisation has been proved a failure by many experiments, but a "simple life" which accepted the comforts of electric light, gas stoves, and laid-on hot water, but abolished heavy curtains and carpets and that multiplicity of ornaments and of dishes, which increases the complexity of life without adding to its beauty, might turn out to be a success. In many cases, however, conventional expenditure is essential for professional advancement. The doctor, for instance, must live in a house of a certain size and importance; the high school teacher or woman journalist must be well dressed. Expenditure of this character is really of the nature of advertisement, and it is foolish to endeavour to curtail it.

After the claims of efficiency have been met, saving and insurance come next. Life insurance is of course almost universal among the salaried classes, and is a duty imperatively laid on every man whose death would leave his family without means. But it is curious that other forms of insurance are not more practised. A small yearly payment for each child, commencing at its birth, would provide a convenient sum for its education, its start in life, or, in the case of a girl, for her trousseau and dowry. Insurance against illness also is much rarer among the upper middle class than among the working-classes. Possibly this is

due to the fact that, save in the case of prolonged disease, salaries are paid during illness, while wages cease as soon as the worker is compelled to stay at home; also partly no doubt to the fact that provision for contingencies is made in other ways.

Saving and insurance will be less necessary in the case of those whose income is derived from land or from invested capital, but should be considered absolutely essential by all those in receipt of a salary. In addition a small sum saved and invested in some easily realisable security will be most valuable to meet special emergencies.

If after all these needs have been met, *i.e.* (1) full "efficiency" and "conventional" expenditure (including, of course, such an education for the children as will prepare them in their turn to earn an income in the same rank of life as their father), and (2) saving and insurance to provide against all contingencies that may reasonably be anticipated —if, then, a surplus still remains, its disposition must be a matter of individual choice, and it is impossible to lay down general rules.

In some cases it will be saved, in others it will be used to provide more material and conventional luxuries, in others it will supply the needs of what American writers rather unpleasingly call the "higher life." Certainly the claims of generosity, charity, and culture should first be met, and it is the right and wise disposition of this surplus income which might well tax the highest powers of any human being. It is commonly

supposed to be a difficult thing to earn money, but a simple matter to spend it. On the contrary, to spend with wisdom and discretion is always hard, and is hardest when the income is so elastic that a slight deviation from the best method is not immediately visited on the head of the person who has offended.

The artisan's wife has no easy task, it must be confessed, but the results of any mistakes she may make fall at once upon herself or her children. But if the mistress of a large household is careless or incompetent, then she may cause untold waste, inefficiency and degeneration among her servants and tradespeople, and may never even be aware of it.

A recent book by Mr. A. Ponsonby[1] gives some extraordinary instances of unnecessary expenditure on food. Mr. Ponsonby is not, of course, to be taken as an unprejudiced investigator; he is writing rather from the standpoint of the preacher than from that of the unbiassed sociologist. But his figures are not likely to be absolutely false, and it is safe to say that if in a household containing four in family and fourteen servants the food bills amounted in a week when there was little entertaining to £60, 12s. 7d. (£3, 7s. 4d. per head),[2] either the servants were being fed in a way that was quite absurdly lavish, or much of the food was absolutely wasted, or there was dishonest collusion between the housekeeper and chef and

[1] "The Camel and the Needle's Eye."
[2] "The Camel and the Needle's Eye," p. 153.

the tradespeople. In any case, the ignorance and negligence of the mistress of the house were corrupting to her staff.

(*d*) Conclusion

In short, in place of regarding the household as standing in no special relation to the rest of the community, it ought to be understood that the function of the housewife is of the utmost importance, not only to her own family, but to the whole nation. It is she who is finally responsible for the education of the children ; it is she who, in the quiet and restful charm of the home, provides (or should provide) for her husband and grown-up children the recreation and refreshment which they need. If she employs many servants, then the example of her household will influence for good or for evil the homes of many working-class couples. It is the demand of the household that determines whether the labour of this country shall be employed on debased articles of sham luxury or on well made and artistic goods.

The conscientious housewife could also to some extent discourage sweating, if she refused to buy products which to her knowledge were made under bad conditions. The responsibilities of the housewife place her at every turn in economic relations to the rest of the community, and therefore it is only right that coming housewives should be trained not alone in the manual crafts of cooking and laundry-work, but also in

the general principles of economic science which underlie the development and present organisation of the household. We may perhaps hope too that the principles of household management may in turn react on economic science, and may show to its professors that value in use, though more difficult to detect and estimate than value in exchange, has been unduly neglected both in theory and practice.

If to the management of our towns—which are, after all, only our homes on a larger scale—were applied the principles used by a good housekeeper in ordering her home, then cleanliness, beauty, and convenience would increase around us. A science of economics so modified would recall to a scholar the original meaning of the word; for what, after all, did the craft of οἰκονομική, as first developed by Xenophon and Aristotle, mean but just "the management of the home"?

SOME RELATIONS OF SANITARY SCIENCE TO FAMILY LIFE AND INDIVIDUAL EFFICIENCY

By ALICE RAVENHILL

SOME RELATIONS OF SANITARY SCIENCE TO FAMILY LIFE

AMONG the many notable characteristics by which the last half century has been distinguished, there are two which bid fair permanently to colour its records and materially to influence the future of our country. I refer in the first place to the scientific study of man, his nature, his needs, and his potentialities; and in the second to the growing appreciation of the fact that the centre of ethical gravity must be shifted from absorption in the sole concerns of self to an intelligent interest in the affairs of others—that is to say, that selfishness must yield to well organised and discriminating social service.

I. MAN'S PLACE IN NATURE

It is of course no new thing for questions upon the real nature of that complex creature, man, to force themselves upon the attention of the observant, and from time immemorial the philosophical have spent themselves in efforts to solve this problem by theories designed to detect, even if not to account for, the agencies

active in the formation of the human mind and body. The records of older civilisations bear testimony to their labours, and are familiar to most students of ancient literatures. But it was not till the resources of modern science forged new tools for the inquirer that it became possible to chisel out from the bedrock of fact the main features of man's physical and social history.

With admirable patience and infinite skill, the scientific craftsmen of recent times have laboriously pieced together the scattered chips of biological research, of human tradition, of tribal customs and of world-wide folklore, until the dignity and power, the beauty and the possibilities of human nature have emerged from the dust of ignorance and the veil of superstition. The result is that it is no longer permissible to deplore in pessimistic tones the inevitable degradation of the race, nor to accept with supineness the threatened deterioration of a population. The forces by which humanity is moulded are no longer unknown ; the principles which underlie social stability have been identified ; the means by which the arts may be developed, which make life not only tolerable but healthful, are ready to our hands.

The far-reaching significance of these facts in connection with human health and progress become apparent when considered in more detail. Observers throughout the ages have gradually noted, and subsequently turned to practical account in garden, meadow, and farmyard, certain

characteristics common to all known forms of vegetable and animal life. By due consideration of these it was found possible to improve breeds, to strengthen and lengthen life, to avert disease, and generally to enhance economic value. It may now appear simple enough, to extend and apply these observations to the betterment of human life; but many generations of human beings slipped away before the facts, dimly discerned by Aristotle and Lucretius, by Buffon and Lamarck, were clearly focussed by Darwin,[1] Wallace, Spencer, and Huxley, through whose skill and labours the continuity of the web of life was first displayed to the world at large. The design may here be almost elementary in its delicate simplicity; there its subtle intricacies well-nigh baffle description. The variety of pattern is marvellous indeed, as Nature weaves with ceaseless industry the woof of progressive development. But the warp of this wondrous web is nevertheless continuous throughout its length, uniting the whole into one vast fabric.

This basic unity of all manifestations of life has been further substantiated by another group of scientists—Schleiden, Schwann, Kölliker, and Virchow, for instance—who gradually and conclusively proved the identity, in their simplest form, of those living bricks (*i.e.* microscopic particles of protoplasm) from which the whole vast edifice of life is constructed. The capacity they

[1] "Darwinism and Human Life," by J. Arthur Thomson, M.A., &c. (Andrew Melrose.)

possess for differentiation in their functions and in modes of combination long masked recognition of the fact that each commonwealth of cells, whether plant or animal, is developed in the first instance in orderly progression from a similar minute speck of protoplasm, acceptation of which has sufficed to bring about a complete revolution in the scientific world. To these discoveries were shortly added Pasteur's conception of the nature and causation of infective diseases; a knowledge which brought with it a great accession of power over hitherto mysterious and uncontrollable conditions. And finally, man's eyes have been opened to the comprehension of Nature's means of self-defence against the micro-organisms of disease. Thus, while humanity is by these means armed with most potent weapons against the inroads of infection, decay, and death, the light thrown upon the mystery of the origin of each individual life has shown man his true place in the kingdom of nature. The application of these great discoveries, together with increased opportunity for and accuracy in their utilisation, constitute the basis of the modern methods of hygiene.

It must be borne in mind that until less than a century ago it was man's custom to dissociate himself wholly from the less highly developed animals and plants which he employed so freely for his support and convenience. He set himself on the highest pinnacle, as it were, of the edifice of life, believing himself to be independent of

the influences by which the rest of the building was dominated. And thus through countless ages he suffered, languished, and died, unconscious that the forces he had learned more or less to control in husbandry and farmyard were in their turn controlling him in the conduct of his life. Ignorant alike of the influences of his own inherited nature or of those of his environment, he paid no heed to the responsibilities of transmitting the torch of life undimmed to succeeding generations, and gave no thought to utilising to his own personal perfecting the resources of Nature, which he habitually employed to increase his wealth or to improve his crops and stock.

It was indeed to the control of his *surroundings* that man first gave more or less careless heed. The fact that environment can either stimulate or stunt both physical and mental powers, thrust itself too persistently on his attention to be ignored ; but the influence of a good parentage or of sound ancestry was less obvious, and for generations received little or no attention. Vague talk on "family temper," "family habits," "family voices" was common enough, but no more than a passing curiosity was aroused as to their hidden import, nor was their profound significance suspected.

Thus, though half a century has passed since Darwin placed man [1] "in his proper position in the sequence of biological forms," during which interim enormous strides have been made in

[1] "The Descent of Man," by Charles Darwin. (J. Murray.)

applying to the betterment of human existence the principles found to hold good in the case of lowlier type of life, public sentiment has so far only supported sanitary reforms directed to the promotion of improved environment. And this in spite of Sir Francis Galton's[1] first appeal in the cause of eugenics more than forty years ago. The distinguishing characteristics of progressive races and the right of every unborn child to be the offspring of healthy, self-respecting, virtuous parents have been repeatedly pointed out; while attention is drawn to the accumulating evidence in favour of the fact that of all influences upon the individual his inherited nature is the most powerful. Yet the public ear remains deaf to the cry that the present generation is largely responsible for the weal or woe of their children's children.

This is not the place in which to discuss Darwin's theory of heredity nor its subsequent elaboration and amplification by his contemporaries or successors.[2] But the time is come when emphasis *must* be laid upon the duty of gaining some general acquaintance with the subject and its applications in the case of an Imperial people.

It may be also well to point out that pessimism is not necessarily associated with the fruits of the studies carried on by our students of inherited qualities, such as Sir Francis Galton or Professors Thomson, Bateson, Karl Pearson, and others;

[1] "Hereditary Genius," by Sir Francis Galton.
[2] "Heredity," by Prof. A. Thomson. (J. Murray.)

only their results give us reason to pause, for they cannot lightly be disregarded. They tell us that we hold in our hands to-day the mental vigour and bodily powers of an untold number of descendants, therefore it behoves us to consider our ways and be wise while there is yet time. For our encouragement also be it known, that while the lamp of modern hygiene illuminates the errors of the past, it sheds its bright rays over the paths of the present, and penetrates to some extent the dim twilight of the future.

II. FACTORS ADVERSE TO HUMAN PROGRESS

It is a matter for regret that the sympathetic consideration for the sufferings of others, which found such grand exponents in John Howard, in Elizabeth Fry, and in thousands more since modern methods of philanthropy were initiated in the eighteenth century,[1] has tended latterly to lose its virility. It is giving place to a maudlin sentimentality, which seeks not only to preserve life at all costs, but to permit, nay to encourage, the production of a quality of human life, so defective, so devitalised, that it threatens to minimise the multiplication of the fit, by taxing them to their detriment with the care and support of the unfit. So to smooth the path of the weakly and unsound as to put a premium on their fertility is false philanthropy and faulty hygiene ; for it is well to

[1] "English Sanitary Institutions," chap. viii., "The Growth of Humanity in British Politics." Sir J. Simon. (Cassell & Co.)

remember that reasonable exertion is beneficial to health ; that to overcome obstacles is stimulating to the energetic ; that some struggle for the means of livelihood calls forth resourcefulness and adaptability in the intelligent. Success in the battle of life comes to those made of stuff equal to the wear and tear of daily existence, and possessed of the qualities which conduce to progress. These are they who are competent to perpetuate the best qualities of a good stock ; these should be the chosen bulwarks of a nation's progress ; nor must their numbers be swamped by the ailing, the crippled, the defective, and the insane.

A proportion probably of some of the deeply seated, complicated, social problems which have presented themselves, unperceived and almost unconsciously, are the outcome of a one-sided study of hygiene : these, combined with the slow growth of social science, and a sickly, easy-going susceptibility, have been allowed to obscure the real issues of many well-intentioned but unwise and ill-considered philanthropic measures. The necessity, the *urgent* necessity, has now, however, arisen for the bold and scientific solution of these social problems. The work of biologists, sociologists, and students of history during the last ten years has illuminated the whole question of race progress and public health with a light so powerful and clear that even he who runs can read the signs of the times by its clear rays ; while to the millions of parents and guardians whose lives are spent in the care of children and home,

its brilliance throws into high relief the dignified responsibility of their work, its far-reaching worth and enduring influence, as well as the fact that for its adequate performance something more is necessary than a bowing acquaintance with modern sanitary science.

For what is the message of scientific hygiene to the parent and householder of the twentieth century? Dr. W. H. Burnham, of Clarke University, U.S.A., a world-wide authority on the subject, has formulated this message for us into three terse, but telling and suggestive, commands.

The first gives solemn warning to beware of fads and of the many popular doctrines which are mediæval in their crudities and damaging by their unconsidered acceptance.

The second preaches the gospel of *work* and self-control, which must be practised in this as in every other connection where progress and good results are desired.

The third enforces the doctrine of cleanliness to a degree as comprehensive as it is unusual—cleanliness in person, dwelling, and food; in air, water, and decoration; in occupation, environment and morals; the work of home hygiene being to secure for each family conditions which will permit normal and unhampered functioning for all the organs of each one of its members; elasticity and pliancy in the functions being a primary characteristic of health.

If once it be accepted that health, capacity, endurance, and energy are more powerful weapons

for a progressive people than are sword or gun, obedience to these commands will be general and their results enduring. The pages of history teach us that each nation in turn has exhibited these qualities at its zenith of success, whether it were the relatively highly civilised inhabitants of Greece and Rome, or the barbarian hordes under Attila. They characterise equally each group of successful pioneers, whether they be the Pilgrim Fathers of the sixteenth, the Huguenots of the seventeenth, or the successful colonist of the nineteenth century. When however their cultivation is neglected the force of the life current of a people or community is lost ; the mighty river of a nation's prosperity dwindles to an insignificant streamlet of mere existence, soon to be lost to view in the morass of oblivion.

To what general causes may such deterioration be attributed ? Among the more prominent must be mentioned ignorance of man's physical nature and of the nurture essential to his welfare ; subtle forms of self-indulgence ; lowered standards of morality ; enervating luxury, or, in some cases, so severe a struggle for existence among the salt of the population (the upper, middle, and professional classes, superior mechanics and artisans), that even patriotism does not justify a quiverful of children. But the persistence of these causes is a national calamity. It is the science and art of hygiene which is emphasising their disastrous consequences. No longer in its infancy, no longer a mere collection of fads, questionable statistics, and empirical doctrines,

hygiene is prepared to inform us how to promote human efficiency in every relation of life—domestic, occupational, social, and imperial. Its tenets are firmly based upon a goodly group of sciences, and their utilisation call into play a whole range of arts. Its theories find confirmation in the social problems of the day, and the experience gained from their tentative and partial application affords sound evidence of their worth to the world. The "expectation" of life, for instance, has been extended ten years in half a century; in twenty years the death-rate has decreased thirty per cent. Disease has been found in most instances to be controllable, and has been controlled; unhealthy occupations have had their dangers curbed if not entirely banished, and the lot of many has been immeasurably brightened. *Yet* the weak joints in the nation's harness are gaping, and the vigour and virility of the masses appear to be diminishing. Again we ask, Why?

III. STAGES IN THE GROWTH OF SANITARY SCIENCE

The answer may be found by reference to the late Professor de Chaumont's now classical outline of the stages to be identified in the hygienic education of a race. He divided these into three periods, of which he described the first as merely "Instinctive," for efforts after sanitary practice were dictated solely by the personal discomfort associated with their neglect. In those far-off

prehistoric days, Professor Boyd Dawkins tells us that primitive man, then in his nomadic stage, would dig runnels to carry off the rain water from the near neighbourhood of his shelters, or would move on to fresh pastures when his family and herds had fouled the nearest stream, or change his camping ground when the accumulated refuse of his food and his prowess as a hunter interfered with convenient access to his dwelling; but he took no precautions to prevent the recurrence of these discomforts, and his efforts to remove their consequences were purely temporary.

To this there succeeded what Professor de Chaumont designated the "Supernatural" period,[1] which extended over many thousands of years, during the dawn of which Eastern rulers often combined in their own person the triple callings of priest, prophet, and physician. Whether it be in China or in Persia, in Egypt or in India, among the Greeks, the Arabs, or the Hebrews, the practice of physical morality and of personal cleanliness, of restrictions of diet or protection from infection, were closely woven into the religion of the people. Reasons of health and sanitary advantages permeate the rules of more faiths than that of the Jews—whose Lawgiver embodied in the Pentateuch health maxims now known to have been derived from earlier civilisations.

But, remarkable and interesting as are the ancient sanitary codes to a generation which

[1] *Les Pouvoirs en Matière d'Hygiène*—Part i. *L'Hygiène dans les Législations de l'Antiquité.* Alfred Filassier. (Paris: Jules Rousset.)

professes to believe in the necessity for hygienic practice, their usage was tinctured from the first by a mass of superstition. Tradition and fatalism hampered true consistency between faith and works ; the often sound regulations suffered from their empirical foundations. Constant warfare, varied by alternations of luxury with asceticism, combined to absorb men's minds and to pervert their common sense, so that plague and famine, disease and penury, were superstitiously regarded as discipline from the Deity, not to be averted or avoided, but rather to be accepted as a chastisement prompted by love. The creed that to save suffering to the vile body might risk the salvation of the soul, cost Europe far dearer than is at all generally recognised ; for the noble, the pure, the high-minded, the intellectual, segregated themselves for centuries in monastery and convent, in the firm faith that by denying to themselves the joy of parenthood they promoted the spiritual welfare of their country. Ignorant of their racial responsibilities, they left as progenitors of the next generation the less refined and ruder elements in the population. It is no cause for surprise, therefore, that progress in sanitation moved slowly. Domestic and urban conditions were permitted of a character well defined by the facts that, in mediæval times, a man of forty-five or fifty was considered long lived, and that first attempts to control disease were based upon commercial convenience rather than upon the saving of life.

To this long night of superstition succeeded the third and last period, known as the "Rational," of which the first dawnings can be detected even in Plantagenet days. In this period it is desirable further to differentiate three stages of progress—(*a*) that of Development, when uneasiness made itself felt, but from absence of knowledge efforts at reform and control were crude, though often intelligent; (*b*) the stage of Legislation, and (*c*) the stage of Freedom.[1]

In the first of these, for instance, Henry III. effected an improvement on any former practice by bringing water to the city of London in pipes, made by boring or burning a channel through the trunks of large trees. Half a century later, in 1297–8, laws were promulgated upon the subjects of offensive trades, food adulteration, and wandering pigs; while Richard II. imposed penalties upon those guilty of fouling rivers and ditches. Out of sight out of mind, however, was the sanitary creed of this and many succeeding generations, so that too often the apparent gain of the moment sowed the noxious seed of intensified subsequent ills.

Sir John Simon has pointed out that it was not until the early part of the eighteenth century that hygiene in its modern significance loomed on the social horizon with clearer outline and more definite aims. A gradual transformation took place in the next hundred and fifty years, when

[1] "English Sanitary Institutions," part i. chap. i. Sir John Simon. (Cassell & Co.)

the national records, as well as the reports of philanthropic organisations, indicate the gradual growth of a public opinion which presently sought its sanitary salvation in legislation. The nineteenth century saw, as a consequence, the accumulation of a huge mass of public health laws, designed to accomplish reforms where philanthropy or self-interest had failed to influence habits.

The suggested designation, namely, the Legislative, is therefore peculiarly appropriate for this, the second stage of progress in the third period of our country's hygienic education. To legislation men pinned their faith as the most potent weapon of reform. From the first most inadequate and ineffective Factory Act of 1802 until the enactments of the last parliamentary session, each year has seen substantial additions made to the growing mass of sanitary legislation, which has become unwieldy in bulk and intensely complicated in machinery.

Any attempt to enumerate even a few of the public health laws which crowd our statute books would here be tedious and out of place, though the community in general ought to be better acquainted than it is with its powers and obligations. For, truth to tell, fifty years of public health administration has proved that human beings are not yet consumed with a sufficiently strong desire for health and efficiency to be willing to change objectionable or unwholesome habits or to sacrifice their conception of comfort at the

suggestion of officials. Indeed the sterner measures of compulsory conformity were so necessary to the education of the public in the elements of healthy living, that the year 1866 saw the commencement of a new era in Public Health Department of the Government. "The grammar of common sanitary legislation,"[1] writes the historian of our "English Sanitary Institutions," "then first acquired the novel virtue of an imperative mood." "Must" was substituted in some laws for "may," and though the permissive has not, even in fifty years, entirely given place to the peremptory, the efforts to effect individual reform by Act of Parliament have, since the formation of the Local Government Board in 1872, assumed more importance and vigour.

Since that date the reports of health committees all over the country record the substantial results of persevering work in the interests of hygiene, qualified by the fact that the experience of other nations has been abundantly confirmed by our own, namely, that it is futile to legislate in advance of public opinion. Until the populace has been impregnated with a knowledge of what is right, right action, though demanded by its legislators, will be perverted by ignorant intention or by resentful indolence. Even those who have served the cause of sanitation most loyally recognise that coercion is but a poor yeast with which to leaven measures for the public weal;

[1] "English Sanitary Institutions," part i. chaps. iii., iv., v., vi. Sir John Simon. (Cassell & Co.)

the product is liable to become sour and worthless rather than wholesome and effective. One higher grade must be passed by the nation under the tutelage of a sanitary reform before its education can be called complete.

The final stage in this last long period is described by Professor de Chaumont as that of "Freedom," of which the attainment is not possible until action is based on intelligent individual conviction. Then and then alone there will be a general recognition that "rights" are inevitably associated with responsibilities, and that true liberty is followed not by license, but by self-control and respect for the rights of others.

IV. WHY THE IDEALS OF MODERN HYGIENE ARE NOT ATTAINED

And so it has come about that, with this ideal in view, the methods of modern hygiene are directed to awaken the nation's sanitary conscience and to stimulate the growth of true civic freedom. These methods may be fairly defined as the working of common sense aided by the results of scientific research, in their turn supported by very carefully tested applications. Necessarily it is assumed that each individual will accord to them intelligent, personal support and, where necessary, will be willing to sink unreasonable likes and dislikes in the sea of social service.

Examples of the enormous benefit inseparable from well-considered sanitary legislation could

be multiplied; though, on the other hand, it is also necessary to check optimism by many illustrations of the grievous harm still being wrought by want of thought. Hindrance to possible progress is also associated with the ignorance of those whose development has not yet attained the level when freedom of action can be permitted. It is some of the results of this ignorant indolence which cause the minds of the thoughtful and far-sighted to be tense with anxiety for the welfare of their country, and arouse a wish for further and more stringent public health enactments. Nevertheless, again it must be said that to legislate in advance of public opinion is futile. Only after stupendous exertion, for instance, has the serious and continued mortality among infants excited general attention; and the curious, widespread indifference to the recommendations of recent Royal Commissions on the Poor Law and the Care of the Feeble-minded indicates that, were infant mortality controllable by legislation, such legislation would still fail of its object unless it were also realised that a child's hold on life is practically dependent upon parental care, and is intimately associated with maternal nutrition before its birth.

Or again; the law relating to the protection of the public food supply is approaching a high pitch of excellence; the penalties on adulteration or on the sale of diseased or otherwise unwholesome foodstuffs are severe and quite frequently inflicted; *but* these regulations are powerless to influence the

errors of nutrition constantly reflected in the features of our population at each age period, neither can they stem the tide of self-indulgence, emotionalism and luxury which enervate and deteriorate thousands of our people. Vain indeed are their endeavours to disguise by alcoholism and drugs the traces of their misfortunes. Stern Nature is relentless; her laws are as those of the Medes and Persians; the children's teeth *shall* be set on edge by the fruits of the reckless folly and intemperance of their ancestors.

Is sanitary legislation therefore a failure, or by what means can light from the sun of knowledge penetrate this dense mass of ignorance and apathy? For what reason has it opposed such a resistant surface to the manipulations of the reformer or to the coercions of the official? These questions do not, unfortunately, admit of concise or conclusive replies.

Each political party in turn points the finger of reproach and derision at its opponents for the modest success by which their legislative efforts at social reforms are attended. Disease, malnutrition, alcoholism and overwork continue to hamper their efforts, and will continue so to do, until a sanitary conscience is awakened in each breast, at an age when habits and ideals are still unformed.

There is no royal road to the solution of these serious problems. They call for infinite, patient and untiring tact, while they also demand the employment of many and varied well-considered

methods, based on a sound foundation of sanitary and social science. The day for reform by theory is over; the moment for practice by individual example and co-operative effort has arrived.

V. SOME CHARACTERISTICS OF MAN'S PHYSICAL NATURE

Before proceeding to suggest some means by which to increase the stability of the national health through the agency of family life, it will be advantageous to recall the advice given to students of any form of life by Professor Arthur Thomson:—that they should, before attempting to form conclusions as to its nature, submit its constitution to analysis, with the assistance of what he described as the biological prism. This, he says, will throw light on the inherited nature of the creature—the capital, so to say, with which it is endowed at birth. It will illuminate the functional nature of its parts, and will reveal what it does in the course of its ceaseless activities—nervous, muscular and organic. Further, the prismatic rays will render visible the results of some of the influences dependent upon the environment with which it is surrounded, which play upon it before and after birth. Unfortunately these rays, when directed to human nature, cannot penetrate so deeply nor divulge so clearly the secrets of this the highest and most complex form of life, as they do when directed to its simpler manifestations. All ordinary difficulties are enhanced

by our human capacity for racial admixture and the creation of an artificial environment.

This much, however, is clearly revealed by a partial analysis. Human beings, in common with all life, are distinguished by the power of movement, and are sensitive to many forms of external stimulus:—heat, cold, electricity, or pressure. They pass their lives in rhythmic alternations of activity and repose; they breathe; they absorb food to supply energy and to maintain unimpaired the substance of their bodies; they excrete waste products. They share with plants and animals an intrinsic tendency to continue their growth for a certain period and up to a definite amount, while, at the close of the most pronounced period of growth, ability to transmit life absorbs the energy hitherto utilised for personal development, by which means the perpetuation of a species is secured. Research shows, also without possibility of question, that certain similar characteristics distinguish the mechanism of every type of animal life; though the machinery be in some cases of the simplest, in others highly complex. Thus have been revealed many secrets of man's physical nature; as, for instance, the knowledge that, in the earliest stages of their existence, higher forms of life recapitulate more or less imperfectly certain far-off ancestral phases of development, of which living specimens are still to be found on the lower branches of humanity's huge genealogical tree. By means also of the close and detailed observation of these lowlier organisms a clearer

conception has been formed of the intricacies of growth and the prolonged process of development in mankind. Just how human beings have come to be what they are, mentally and morally as well as physically, is a still unsolved problem. There are, of course, many missing chapters in the long story of life, though so far no contradictions have been detected in its arguments. The sad side of this biological lore exists in the now ascertained fact that the highest intellectual and moral powers, those last to develop, are the first to suffer arrest or to die away when the organism is subjected to premature exhaustion or to precocious responsibility. Predisposing causes are found in disease, dissipation, or defective nurture.

Another of the more important lessons to be learnt from the pages of this book of life's history is the conservative influence of the law of inherited nature ; a law which makes for the preservation of racial types by suppressing wide deviations from the normal. A familiar illustration of this may be found in the fact that the children of parents of great height or of very short stature usually revert to the average of the race. The significance of this genetic relation in maintaining an efficient people was unrecognised until quite recent times, and though valuable evidence is accumulating on the descent of hereditary character in mankind, no definite conclusions have yet been reached on the *intensity* of the transmission of qualities. It is, of course, a subject of intense complexity, the full discussion of which is here impossible. In the

interests of future generations it is, however, to be wished that more thought were given to the conclusions it is allowable to draw. "If," for instance, says a recent writer, "instead of allowing the race to mate at random we selected both parents for some one quality, we could raise the intensity of inheritance and establish gradually, by continued selection, a strain in which the quality reached a value much higher than the average in the original mixed race. . . ."[1] Thus could a race be strengthened for life's calls, or, on the contrary, until and unless the people are awakened to the existence and bearing on their national security of such fundamental hygienic influences, it can be emasculated. No such selection is likely ever to dominate human marriages, but an appreciation of these and similar facts is fundamental to national progress; and in time the dissemination of such knowledge will be considered a parental duty, the more urgent since the resources of civilisation and ill-regulated sympathy have combined to brush aside the sterner laws of nature, so that the deteriorated threaten to become the chief progenitors of the next generation.

During the process of studying the abundant evidence of life's progress from the simple to the complex, it becomes also apparent that it is affected by forces other than heredity. Recognition of the ever-present influence of these potent but often disregarded forces makes for harmonious living, whereas their neglect is associated with

[1] "The Family and the Nation," chap. i. Whetham. (Longmans.)

heavy penalties. I refer to the capacity for individual variation from the racial type; to the modification of each individual by his or her surroundings; and to the personal predisposition, technically described as diathesis, which influences the reaction made to every form of stimulus. Of these three forces, the first is the result of an inborn tendency to deviate from the ancestral type; an orderly process with a definite intention, by no means a mere chance fluctuation. This certainly makes for progress as well as for interest in life, though it enhances the difficulties of education, because it demands the adaptation of conditions to each individual's requirements. The second, the law of modification, takes into account the influence of environment upon inherited nature; the effects of climate, and food, for example, or of forms of occupation. Predisposition is, of course, a personal quality—a factor of primary importance in our susceptibility to or power to resist disease or in our capacity to withstand adverse conditions. This property is responsible for the greater or less degree of adaptability to new conditions possessed by each of us, and is concerned with our power to live in tune or at discord with our surroundings.

Another biological law, that of periodicity,[1] or of rhythmic alternations of activity and rest, has hitherto often suffered among human beings

[1] "Selected Essays and Addresses by Sir James Paget, F.R.S."—"The Chronometry of Life," Royal Society Croonian Lecture, May 1859. Edited by Stephen Paget, F.R.C.S. (Longmans & Co.)

more in the breach than in the observance of its tenets; though unquestionably conformity to its requirements makes for health and stability. Throughout nature habits of rhythmic, organic activity are too familiar to attract attention. Of these, the periodic return of the seasons, for instance, or the daily tides, the flowering of plants and the ripening of fruit, the migrations of birds and the hibernation of certain insects and animals, are obvious examples. These rhythms have been proved by experience to be advantageous in the world. They make for efficiency and economise energy, and, from their high degree of development in man's nature, it may be fairly assumed that to him their observance is of great consequence. Many of them are beyond his control; such, for example, as the diurnal variations of his body temperature, the beating of the heart, the call of hunger, or the rhythm of growth. Others he can observe or abuse according to his pleasure; sleep, for instance, or the rhythm of work, or the daily discharge from his body of its waste products.[1] It is the work of hygiene to demonstrate how to combine obedience to all these laws with the demands of modern existence, and it is the duty of man to conform reasonably to modes of life based on these demonstrations. More especially does responsibility for the establishment of certain rhythms, such as sleep, devolve upon the organiser of a child's early life.

[1] "The Diurnal Course of Efficiency." Howard D. Marsh. (The Science Press, N.Y.)

VI. THE ORIGIN OF FAMILY LIFE AND ITS RELATIONSHIP TO SANITARY SCIENCE

Further researches into the records of the past, and a closer study of the underlying principles upon which humanity has formulated many generally adopted customs, indicate how unexpectedly intimate is the relation between the growth of a social organisation and the origin of primitive efforts after the preservation of life and health. The world at large is so accustomed to the widespread existence of family life that curiosity is rarely aroused as to its origin, intention and worth ; consequently to ignorance of its significance must be attributed the assertion that the custom is wellnigh obsolete and the proposal of some would-be reformers to abolish the institution and to instal the State *in loco parentis*.

Professor McDougall[1] assures us that such is the social importance of the family that all who have given serious attention to the question are agreed that the stability of the family is the prime condition of a healthy state. This opinion is supported by other writers,[2] who have emphasised their conviction that the healthful development of the individual—even the possibilities of racial progress—depend to a large degree upon maintaining intact the integrity of family life.

[1] "Social Psychology," section ii. chap. x. William McDougall. (Methuen.)

[2] "The Family," Lecture i. E. C. Parsons. (Putnam.)

Their conclusions are based upon recent researches into the sciences of biology, sociology, and economics.

The origin of this relation is apparently traceable to one of the many forms of human association which have proved advantageous in the struggle for existence, when the value to a man and his wife of so protecting their offspring during childhood that there should be later on an array of lusty sons and industrious daughters thrust itself on their notice. The division of strenuous work, for instance, the pursuit and preparation of food, the effective defence of their rude shelters against the depredations of their foes, were substantial advantages to be derived in primitive times from the possession of a large group of children. Upon the youthful vigour and strength of their family the parents could rely also when overtaken by the weakness of old age or by accident or disease.

These economic and sociological advantages were so early appreciated and are so widely adopted that traces of family life are to be detected in the history and customs of every tribe or community hitherto investigated. The bond thus formed, even amongst the lowest savages, first developed, then strengthened the ties of natural affection between a mother and her children and prolonged its emotional existence. In the case of the paternal parent, it is probable that the motives which incited him to make the efforts necessary for the protection of his helpless infants might more

probably be found in the desire to leave an avenger on individual enemies and a feeling that funeral rites would be duly performed after his death, as well as his tribe strengthened in war.

The gradual development of the human home has been admirably described by more than one writer, who has associated its evolution with the gregarious instinct, recognised in many of the higher forms of animal life.[1] Within reason, associated numbers represent power—power to preserve the progeny, therefore to maintain the numbers, which again in reason make for social support and independence. Power for defence, power to secure an adequate supply of food and ability to differentiate occupations, thus dividing labour, so that while the men of a family group were engaged in war or the chase, their womenkind devoted their attention to the creature comforts which promote health and efficiency—these are all factors which make for progress.

VII. WOMAN'S VOCATION IN HOME AND FAMILY LIFE

And so it came about that to some extent woman's special and privileged vocation as a home-maker began even in prehistoric times. Upon her it devolved to rear the children she bore; to cook, to mend, to make, to spin and dye and weave; to prepare a welcome for the victor and to minister to the sick or wounded. No sense of menial

[1] "The Family," Lecture ii. E. C. Parsons. (Putnam.)

limitation in their duties was apparent among the notable women of the past. They were skilled workers, capable and respected managers, under whose direction men as well as women carried out the details of daily work, to whose care in later centuries castle and garrison were entrusted in the absence of their lords, and who most evidently assumed this responsibility with confidence and success.

The changing conditions of the last three centuries, however, reacted in many ways to the detriment of women's domestic energies and sapped their pride in the vocation of housewife. Industrial developments took much occupation out of their hands, and they were not apparently concerned to undertake others more in consonance with modern life. As concentration of the population in large centres undermined the last survival of feudal conditions, the strong conservative instinct of women made it hard for them to adapt themselves and their households to revised methods:—to substitute "new lamps for old," so that gradually it seems women became split up into two parties, somewhat out of sympathy one with the other. Adherence to the traditions of the past and the attractions of social life distinguished the one party; a restless desire to give scope to their whole nature and to work out their own salvation on unconventional lines possessed the other. In the one case there was no desire for domestic reformation. What methods could be better than their great-grandmother's!

In the other, glimpses of what seemed a far wider and more intellectual life than that of the ordinary housewife diminished interest in the physical needs of human nature, which it was thought made no claims on mental faculties, and of which the daily care was constantly associated with irksome restrictions and a position of financial dependence.

It is not possible here even to outline the numerous social and commercial innovations which have modified every side of daily life for the last two hundred years ; but, when inclined harshly to rebuke women for some of their now almost inexplicable blindness to these changes, it is well to remember that the flood of new discoveries, new inventions, new modes of transit, new forms of occupation and amusement, new means of money-making and fresh excitements imposed an enormous strain upon nervous systems, still but slowly adapting themselves to the stir and stress of the modern world. That eyes should be temporarily dazzled by the brilliance of the "wonderful century"; that the first results of freedom from a period of unnatural restraint should be intoxication with liberty, is not surprising. Full of encouragement is, however, the fact that an increasing number of women of all ranks are engaged to-day in efforts to direct the light of modern knowledge to the betterment of human life ; the movement speaks for the innate soundness of their womanhood and for their realisation of their imperial responsibilities. Many of these efforts are still unsystematised, many good inten-

tions are held to be of equal worth with organised practical knowledge; many women are alive only to the needs of the least favoured of the community and are dead to the urgent calls for intelligent reforms in their own domiciles. But if the willing mind be there, the direction of the work into desirable channels will slowly though surely follow. It is most certainly unnecessary to pour every girl into the mould of a conventional German hausfrau in order that she may perceive the inner meaning of family life. God fulfils Himself in many ways, and diversity of training and of interests is as beneficial as it is desirable. Neither can the women of a country single-handed conserve this great institution of family life. The loyalty of boys and the co-operation of men are imperative to its preservation. They as well as their mothers, wives, and sisters must realise its responsibilities and opportunities, and must maintain the dignified position of those who preside over this unit of community life; they also must respond to the crying need for its adaptation to the requirements of modern civilisation.

VIII. THE FUNCTION OF THE FAMILY IN NATIONAL LIFE

Mrs. Bosanquet[1] has told us that the most important economic function of the family to-day is its direct control of the prosperity or ruin of

[1] "The Family," part i. chap. ix. Helen Bosanquet. (Macmillan and Co.)

nations; for here alone are found in combination the forces which determine the quantity of the population with the forces which determine its quality. To control these forces offers, to say the least, a life-work for countless men and women. Both parents must safeguard the character of their children's inherited nature; both sexes are more or less directly or remotely concerned in the provision of a suitable environment for human lives, infant or adult. Under the circumstances it may well be a matter for surprise that we have been so slow to perceive that the right performance of these duties demands a preliminary study of the art of preserving health and promoting progress, and we marvel at the placid spirit of content which has sanctioned the conversion into a stronghold of empiricism, the very place where a sound knowledge of progressive sanitary science is of primary importance.

In the book to which reference has been already made, Mrs. Bosanquet also enumerates the causes which in her opinion militate most actively against the continuance of family life at the present day. Among others she mentions evasion of responsibility, self-indulgence (with which we are very familiar), reliance upon external sources of maintenance, and the unequal distribution among the members of a family of the burden of support. Further, she refers to the unfortunate failure among parents to realise that the old Roman customs of parental possession and filial submission are out of date to-day, and calls upon the wise guardian to substitute others which lead to loyalty and love.

The new movement for a study of the characteristics of childhood and adolescence should materially contribute to the realisation that this parental attitude of dominant authority must be now associated with and modified by a more balanced understanding of the phases of youthful development and of the intricacies of individual temperament. Convenience has hitherto encouraged the customary regulation of a group of young lives as if they were one and the same individual, no allowance being made for variation in character or in age, in propensities or in health. Each nursery party or infant school serves to illustrate the point. Individual tendencies to cold or to fatigue, to nerve storms or to indolence ; individual capacities in diet, occupation or exercise, must be intelligently respected if potentialities are to become actualities.

In the well-conducted home, for example, a study of individual character must in the future replace cast-iron discipline or easy-going, child-spoiling indulgence. The fact that the early cultivation of good habits makes for healthful happiness must be generally appreciated ; and the duty of the home to provide opportunity for the exercise of personal tastes, the importance of training as a relief to nervous strain and as the best means to develop resource and skill, must be perceived. It will be by this constant understanding supervision in early years, and later by the cultivation of an intimate sympathetic comradeship with his children, that the modern parent will retain for his country the cementing force of family life.

IX. THE MEANING OF INFANCY

The great discovery of John Fiske as to the reasons for the long continuance of childhood in man must not be overlooked in this connection; it bears so directly on health and efficiency, and is closely associated with the importance of the family to the individual as well as to the nation. Why, it may be asked, is man's period of helplessness so prolonged; why, when his brain development reaches so high a standard, is he for years in a position of entire dependence, whereas snakelet and chick are practically self-supporting from the hour of hatching? When the lower forms of animal life are compared with mankind, the non-existence in their case of any such stage as infancy is at once apparent. They are brought into the world able to take care of themselves and to live an independent individual existence. Young pigs run almost as soon as they are born, young swallows fly directly they are fledged.

Now, if the structure of lower animals be examined, it will be found that they have no central warehouse corresponding to the human brain for the storage of new sensations or for an elaborate and original response to them. Each such animal repeats the life of its parents; each responds in exactly the same way to the contact of air, of earth, of food, or of water. Their activities, it is true, are distinguished by accuracy and despatch, but the offspring of a hen of the twentieth century has no larger capacity for the variation of these

activities than has the chick which was hatched out six thousand years ago. The guinea-pig of to-day, for example, remains mentally at the level of his thousandth ancestor. Wherein then lies the difference between the pig and the baby?

As animals rise in the scale, as their brains become more subtle, more elaborate in structure, their actions become correspondingly more numerous and complicated, more varied, more individual. The nervous systems of such animals are characterised by an increasing complexity of development, and this provides the machinery necessary to the performance of an increasing number of muscular and mental co-ordinations; they can adapt themselves to unfamiliar surroundings and possess much enhanced advantages in the struggle for existence. *But*, associated with these advantages, is a much longer period of immaturity, because, where the capacity for flexibility and progress is great, the antenatal period is insufficient for the establishment of the necessary nervous connections or even for the development of the brain cells between which these connections will be formed. The chick will have its full plumage in ten weeks, but mentally it is far below a dog or a monkey, whose period of immaturity is much longer. Similarly, the dog attains his maturity long before the monkey, who is infinitely his superior in fertility of resource, power to learn through imitation, and capacity for attention. The infant in its turn is far longer in a dependent condition than the highest ape.

Relatively large in bulk at birth, and reaching usually its full mass in the first fourteen years of life, the human brain possesses throughout childhood vast silent areas, big with future potentialities, areas in which the cells are slowly ripening to function. Even after full growth in size is reached, many more years must pass before capacity for the higher mental functions or for the complete control of such functions has developed. It must be borne in mind that, throughout this period of immaturity, errors of nutrition or defective stimulation may interfere with function. One of the most important duties of the home is to provide the suited environment for its child occupants during these long and anxious years. How long they are has been emphasised by Dr. Clouston,[1] who has said that, of all the periods of brain growth, the most important, as regards the development of our highest moral and mental potentialities, is that between eighteen and twenty-five years of age, when the capacity for self-control should be coming into function in its highest relations, and when failure to ripen in due course is fraught with most serious consequences for the future.

There is no such thing, therefore, as infancy or parental care in the lowest orders of animal life ; of which, one result is a gigantic mortality among their offspring. Enormous numbers of eggs are laid to ensure the preservation of

[1] "The Hygiene of Mind," chap. iv. T. S. Clouston. (Methuen.)

the species when left to fend for themselves. The turbot, for instance, must deposit millions of minute glassy ova or the species would become extinct. Even among frogs the destruction of tadpoles is so great that provision must be made to allow for this loss. The fostering care of birds for their young at once permits a great reduction in the number of the offspring; but, though birds give evidence of some capacity for parental care, infancy, as such, is really confined to mammalian young. Even here it is curtailed in a vast number of species; but wherever it exists it stands for power to progress, and represents capacity for benefiting by, indeed depending upon, education, if only in the simple form of learning by imitation—a form familiar to readers of such books as Long's "Schools of the Woods."

Plasticity is the hall-mark of progress; educability indicates a brain more or less competent to assimilate, to remember, to compare, to discriminate. This door of progress has been merely set ajar for even the higher apes; it is open to man only. The period of plasticity is evidently prolonged in proportion to the degree in which conscious intelligence has superseded mere brute force in promoting successful survival—that is to say, the transmission of *mental ability* rather than of *physical strength* postpones maturity. Man alone possesses in full the powers of selection and adaptation, of reason and of emotion, of memory and of mental originality, which are

included in his rich heritage of life. If he is to realise his full potentialities, he must have protection for years after birth and an extended time for development. The immature infant must be fed, sheltered, and stimulated, if the inherent powers of adjustment to surroundings are to develop normally. But so great is the instability associated with human immaturity and future potentiality, that arrested development is too often the heavy penalty paid by the child for the ignorance and carelessness of his parents.[1] Faults of food and clothing, insufficient warmth, cleanliness, or exercise, premature work or precocious responsibility and independence, prolonged overstrain or insufficient stimulation of mind and body, are the prevalent causes by which a child's normal growth is warped and prejudiced.

[1] "Report of the Inter-Departmental Committee on the Employment of School Children, appointed by H.M. Principal Secretary of State for the Home Department," 1901.

"Report of the Royal Commission on Physical Training (Scotland)," 1903, Neill & Co., Ltd., Bellevue, Edinburgh.

"Report of the Inter-Departmental Committee on Physical Deterioration," 1904.

"Report of the Inter-Departmental Committee on the Model Course of Physical Exercises," 1904.

"Report of the Inter-Departmental Committee on Medical Inspection and Feeding of Children attending Public Elementary Schools," 1905.

"Report of Dr. W. Leslie Mackenzie and Captain A. Foster on a Collection of Statistics as to the Physical Condition of Children attending the Public Schools of the School Board for Glasgow," 1907.

"Report of the Royal Commission on the Care and Control of the Feeble-minded," 1908.

"Report of the Royal Commission on the Poor Laws and the Unemployed—Majority and Minority," 1909.*

* In each case, unless otherwise mentioned, these Reports are published by Wyman & Sons.

Where this occurs he never enters into his birthright of power ; it has too often been thoughtlessly bartered by his natural guardians, literally for a mere mess of pottage.

X. CAUSES WHICH MENACE HEALTHFUL INFANCY AND CHILDHOOD

Perhaps one of the greatest inconsistencies of an inconsistent nation lies in the fact that the extraordinary ignorance of the elementary needs of a tender infant is not confined to one section of society ; it is found in Belgravia as well as in Bermondsey. Thus, though the chief sources of the tuberculosis which is responsible for the presence of 45 per cent. of the children in the London Invalid Schools are confined to the homes of the poorer classes,[1] inquiries into the incidence of rickets among children in Glasgow show a higher percentage of cases in the families of mechanics than of labourers[2]—a clear illustration that ignorance and not poverty is here the predisposing cause. Impure air and stuffy, ill-ventilated rooms are concerned in the susceptibility to both diseases, as is also malnutrition with its associated diminution of the innate powers of self-protection. But, in the one case, inability to provide suitable food is the general cause ; while in the other,

[1] "The Hygiene School of Life," chap. viii. p. 129. Ralph H. Crowley. (Methuen.)

[2] *Journal of the Royal Sanitary Institute*, April 1905—"Physical Inspection of School Children in Relation to Public Health Administration." A. K. Chalmers, M.D., M.O.H., Glasgow.

inexcusable ignorance of the right forms in which food should be supplied to young children is a certain source of the evil.

The thought is pathetic, for the causes are wholly preventable. Pitiful also, because less excusable, is the grievous injury to health associated with a mouth full of rotten teeth, permitted as it is among families possessed of sufficient means to meet the cost of cure, who prefer to spend their money upon dress and amusement, or among the members of which necessary endurance of a trifling shock has not been cultivated. Were the foulness of the discharge from a carious tooth to be externally visible, the æsthetic instinct among the refined would clamour for prompt treatment ; but, unfortunately for health, the results of the disease are concealed, and consequently condoned.

Again : light, sunshine and quiet are now known to be essential to physical development and to the possession of a sound nervous system ; the statement amounts to a platitude, for is not every wealthy invalid despatched to complete convalescence by the sea or in the country, and is not the custom of a general annual holiday due largely to the conscious benefits derived from an open-air life far from the bustle of towns ? Yet physical morality is so poorly developed that the atmosphere of suburban as well as urban districts is permanently obscured by the preventable and wasteful results of imperfect combustion, though the detriment is incalculable to those whose lives see

no change of air. The ceaseless rumble of noisy traffic, allowed to disturb the rest of thousands, or more probably of millions, of our population, is another factor responsible for the prevalence of unstable nerves and of ill-balanced brains. It assumes great gravity when it is realised that among these sleepers are numbered the children whose hours of rest are already most seriously curtailed.

Another sin against childhood bears long enduring fruits. I refer to the terrible results upon the lives of those infants who survive efforts to prevent their birth. The fact ought to be, if it is not, common knowledge; yet the sale of the infamous drugs, necessary to the crime, by pennyworths, in every drug-store, is tacitly sanctioned by the community.

Professor Sadler's[1] determination to direct attention to the requirements of our adolescents has aroused such response, that excuse is now impossible for ignoring the detrimental effects upon young people of unskilled, exhausting "blind alley" work, or of removing prematurely the restraint of moral discipline and systematised training.[2] Statistics show not only the economic disasters which result from the unsatisfactory methods of past years; they bring home also the steady increase in the percentage of the proportion of nervous instability as well as of anæmia, which

[1] "Continuation Schools in England and Elsewhere." M. E. Sadler. (Manchester University Press, 1907.)

[2] Report of Departmental Committee on "Employment of Children Act, 1903." (Wyman & Son, July 1910.)

interfere with the form of brain growth so rapid in adolescence (namely, increase in complexity of association, and in power to inhibit, to reason, and to concentrate). Another result of these investigations is to draw attention to the increase in organic heart disease, which has been shown to occur in more than thirty per cent. of the London errand boys who are engaged in prolonged work on Saturdays, as well as in out-of-school hours during the week.[1]

Should not parents inform themselves diligently on these matters? for there are warnings and to spare from physician and educationalist upon this reckless wreckage of the nation's most valuable asset. It was pointed out ten years ago that the imposition of adult duties upon the child, or even upon the young adolescent, is the most effective machinery for the manufacture of the unemployed and the unemployable. Only now, however, are bye-laws being sanctioned which impose at all adequate restrictions upon child labour. For a longer period the steady migration of the rural population from country to towns has been bemoaned, as coupled with the risk lest the deterioration of the individual decline into the degeneration of the race. Nevertheless, in spite of the sustained efforts of the Rural Housing Association and of private individuals, the housing problem still lies at the root of some at least of this exodus. Miserable and inconvenient as are

[1] "Report to the L.C.C. Education Committee of the Medical Officer (Schools)," March 31, 1906. (P. J. King & Son.)

hundreds of our cottages, their number is still insufficient in many places to meet the demand; so perforce the young people of marriageable age must go, or the elementary code of decency must be violated.

The curse of alcohol,[1] too, lies heavy on our land; it shortens life, incapacitates for work, impoverishes and degrades; visits in innumerable forms the sins of the parents upon their innocent yet grievously afflicted children; promotes crime and perverts judgment. Each year brings more statistical and biological evidence of its enduring and deteriorating effects upon humanity. It seems strange, therefore, that the law to insist upon the provision of an adequate water supply for every dwelling remains entirely insufficient to meet the most urgent needs of many town streets as well as country villages. Cleanliness is consequently impossible, and the public-house must be perforce frequented, for it provides a beverage more palatable and perhaps as wholesome as the cottager's nearest supply.

XI. THE SOURCE OF THESE CAUSES TO BE FOUND IN FAULTY ADMINISTRATION OF THE HOME

May not the causes of some considerable proportion of this apathy be traced to a want of popular faith in the teachings of hygiene? Is

[1] "The Drink Problem," edited by T. N. Kelynack, M.D. (Methuen.)

not one source of the prevalent unbelief in its tenets to be found in the widespread ignorance of the right administration of human life in the home, which turns out therefore a product of unhealthy, inharmonious citizens, who are a source of weakness to their country and a menace to civilisation? How could it be otherwise? If the cradle of life be defective, and its occupants be debilitated, it is not the nurslings alone upon whom the penalties will fall; whereas if home administration be guided by intelligence, and the quality of the inmates be high, individual and national prosperity are assured. The burden of responsibility or the privilege of promoting progress (according to the spirit in which obligations are assumed) rests with those who propose to be or already are parents; they being influenced in their turn by the educational and social conditions of their surroundings. Parental care and intelligent home management are thus intimately concerned with the physical evolution of the race, as well as with its moral development. They must, therefore, assume an increasing rather than a diminishing importance, if the full development of potentialities is to be insured in the rising generation, and racial progress promoted. Any proclivity to depreciate the dignity or to undermine the influence of these institutions must be carefully examined and, if necessary, sternly repressed.

The fact that such tendencies show signs of sprouting is, it seems to me, a serious reflection

upon the parental and domestic methods of the day. There is no smoke without fuel; faults are rarely all on one side; the young are not necessarily always in the wrong; therefore, a course of self-examination into their methods and motives may be a wholesome and fruitful discipline for those who are responsible for the nature and nurture of our children, and for the stability and efficiency of adolescent and adult. The absence of elasticity and adaptation to modern requirements among the elders of a family is often responsible for miserable homes, and for much arrested development in their inmates.

XII. HARMONIES AND DISHARMONIES IN HUMAN LIFE

Such a condition of affairs is, however, no longer to be tolerated; for the result of research carried out during the past and present centuries has opened up a hitherto unsuspected vista of progress to mankind, if and when he is intelligent enough to establish an harmonious unison between himself and his environment. Once the jarring discords of debility, disease, and deterioration have been modulated into the major chords of health—moral and physical—the latent potentialities of his higher life will be quickened into productive activity. The misconception of humanity which has denied to it the power to rise above the level of present attainments, which

has dwelt insistently upon the hopeless degradation of the body, has brought about a condition of enervating and passive fatalism, based upon the conviction that all reforming efforts must be directed solely to the preparation of one part only of man's triune nature for another and future sphere of existence. The duty and possibility of building a fit temple for man's spiritual nature here and now is the ideal of a minority to-day — in the future it will be that of an overwhelming majority ; for the proofs of human capacity for progress, of man's power to control the forces of nature, are ever becoming more firmly authenticated, and all that they imply will soon become far better understood.

Though our knowledge of the subject is still incomplete and often tentative, much progress has been made, for instance, in a correct conception of the means by which the physiological balance of human life is adjusted, since Metchnikoff[1] drew attention to the interference brought about in man's normal development by certain fundamental disharmonies in his constitution, of which the end is premature death, if not a pathological old age. It is quite evident that unjustifiable encroachments upon the reserve powers of the human body have been commonly permitted hitherto, and though each year brings fresh proof of the extraordinary endowment

[1] "The Nature of Man," parts i. ii. chap. vii. ; part iii. chap. xii. Metchnikoff. (Heinemann.)

which it possesses to respond to the demands made upon it, yet each year also confirms the conviction that this reserve fund must in future be husbanded and used with economy. When these powers are constantly drawn upon the body is necessarily reduced to a lower level of health. If the metaphor be employed of the body as a building in course of erection, it becomes obvious that if one of a group of converging thrusts be much weakened or withdrawn, a skilful rearrangement of forces may meet the strain, but the total strength of the structure is reduced. In how many cases has the temple of a child's body been permanently damaged by such withdrawals, or how many adolescents are launched into life with their capital of health seriously diminished by premature calls upon its resources.

The duty to maintain so far as possible a condition of physiological equilibrium in ourselves and in our children amounts to an obligation; for which reason health promotion during the plastic period of early life assumes a new importance. Of course, a certain capacity for vicarious activity is associated with the various organs of the body in order to maintain their functions against temporary failure. Healthy tissues are furnished with power to respond to increased call for exertion. How often are they most sorely abused and unwisely taxed? Even now, when made aware of these facts, we are slow to apply to the conduct of life the lessons thus taught

us, and continue to be filled with self-commiseration for the results to our bodies of overtaxing their capacity for accurate readjustment.

It is not possible, much less desirable, that the whole population should plunge into amateur studies of recent physiological advance, nor even that it should dabble, as its units are too much disposed to do, in pseudo-scientific pathological publications. But it is both possible and desirable for all who assume the direction of their own lives or those of children to "read, mark, learn, and inwardly digest" some fruits of the labours of others in the garden of health.

Were there one fixed standard of health to which all could attain, the practice of hygiene would be attended by a charming simplicity. Unfortunately, modern science forces us to conclude that each individual can only reach his own particular standard of well-being. The grades of health are consequently infinite in number, and the task which devolves on parents and guardians to secure that the standard possible to each child under their care be attained is no light one. So general is the blindness to these truths, that the degree of health enjoyed is in most cases far below the possible standard; the results of ancestral vice, of parental ignorance, or of defective environment having sapped prematurely the springs of progressive potentiality.[1] The mental and physical balance is thus rendered

[1] "Principia Therapeutica," chaps. ii. iii. Harrington Sainsbury. (Methuen.)

relatively less stable and the powers of resistance to adverse conditions are diminished.

Happily, by virtue of its inherent power, but strictly in proportion to the vigour of this power, an organism is usually able to strike a new balance; for the capacity to regain its equilibrium is exquisitely delicate in human nature, *if* the change be neither too sudden nor too severe. Throughout life this process of self-adaptation to the presence of morbid influences is constantly exercising its protective power. If, however, the effort to overcome disadvantageous conditions be very great or much prolonged, the life of the individual is never quite so vigorous and symmetrical as it might and should have been. In a luminous address, delivered at the University of Leeds some few months ago,[1] Lord Justice Fletcher Moulton instituted a comparison between the human organism, which invariably tends to swing back to the normal whenever the balance of health is disturbed, and a ship which has safely weathered a stormy voyage. The ship, he writes, "is not stable, if stability means that she can defy the forces that bear on her to move her from her normal upright position, for . . . the slightest roll of the sea . . . will make her heel over. But she is stable, because when made to lean over, there is thereby generated a system of forces tending to return her to her place, which grows

[1] "Some Thoughts on Causation in Health and Disease." An address delivered to the Faculty of Medicine, October 1909, by Lord Fletcher Moulton.

greater the greater is the displacement, and thus ultimately becomes sufficient to overpower the disturbing forces. . . . As the ship arrives safely, her construction must be such that disturbances tend to right themselves when stability is seriously endangered. Some corresponding righting force also tends to bring back an organism to its normal state."

The caution may not be amiss that the amplitude of the swing of a human pendulum, as well as the accuracy of its final balance, depends not only upon inherited nature and the amount of reserve force possessed, but will be stable or feeble, durable or transient, according to the influence of environment.

In what way, it will be asked, can individual capacity for health be gauged? to what degree can the power to progress or to resist encroachments be strengthened? at what age is intelligent supervision most important?

No concise and conclusive answers can be given to these most natural inquiries, but much light has been recently thrown upon the long duration of immaturity and associated instability in mankind; upon the power of self-protection inherent in the body;[1] upon the influence thereon of its environment; upon the penetrating power of heredity; and upon the urgent importance of the adolescent period.

[1] "Studies on Immunisation." Sir Almroth Wright, F.R.S. (Constable.) "Immunity in Infective Diseases." Metchnikoff. (Cambridge University Press.) "Immunity and Specific Therapy." W. d'Este Emery. (Lewis & Sons.)

Further, it appears that the healthful body is equipped to withstand the attack of the bacteria of most diseases, though the mechanism of self-defence is of more kinds than one. Of the different pathological bacteria identified up to the present, for instance, some appear to be eminently sensible to one kind of action of normal blood fluids, while they are in a much less measure sensible, or are, perhaps, entirely insensible to others; a complication which enhances our respectful admiration for the marvellous and intricate system which provides for our bodily welfare. Obviously, human nature would be practically immune from disease if this protective machinery were always in good working order: unfortunately this is not invariably the case—hence disease. It is the duty of hygiene to insure constant physical equilibrium, but the intricate tactics of Nature are as yet so imperfectly understood that man is not yet an ally of great worth in her operations.

Nevertheless, the perception that the secret of individual health lies in fostering the resistant or protective elements, which should be present in normal blood, marks a great step in advance; for from it have originated measures to curtail the course of an illness and to reduce the risk of its recurrence. It is hardly Utopian to forecast, as Sir Almroth Wright has done, that the physician of the future will take upon himself a still higher rôle than he has hitherto assumed in this work of the prevention of ill-health, for he will attempt, by means of systematically

strengthening individual capacity for resistance to disease, to remove the necessity for curing those who have fallen victims to its attacks. The gain in health, in happiness, in time and in money would be incalculable. For instance, had the death-rate *all* over England during 1908 stood at 13.8 per thousand, instead of at favoured places only, no less than 33,831 lives would have been saved. Of these deaths, one-fifth were those of infants under twelve months old, the majority of them wholly preventable. What a reckless waste of racial and national capital; what an unnecessary cause of bitter sorrow and disappointment; what a source of unprofitable expenditure! The calculation has been made that for each death there are at least six cases of more or less serious illness, involving confinement to bed for a few days or a few weeks as the case may be. A simple multiplication sum will enable the reader to estimate the amount of serious illness represented by the total arrived at: the loss in time, health, happiness and efficiency is incalculable.

The bright prospects for human health in the future, therefore, rely largely upon the use which will be made of this protective machinery, and the prospective gain to humanity lies in the hope that when family histories are kept systematically and the inherited tendencies of a child are far more accurately known, the invading forces of disease will never get a footing, because precautions to strengthen the body's own defensive powers will

be taken as a matter of routine practice. The physiological balance being thus preserved from disturbance, the great fund of energy now utilised to resist encroachments will be available for productive purposes.

So great a reformation cannot of course be brought about till shame is felt for the scandalously low standard of health now common among all classes, nor until a general determination is developed to remove the minor miseries from which we all suffer more or less impatiently.

XIII. THE IMPORTANCE OF MENTAL HYGIENE IN FAMILY LIFE

The result of a curious obtuseness to the economics of personal and domestic hygiene is also responsible for another serious dereliction of parental duty, by which health and progress have been grievously, though quite unnecessarily and constantly, hampered. I refer to the general failure to economise nervous energy or to take any interest in what is rightly called mental hygiene. Yet Press and people alike deplore the evident increase of mental abnormalities, and anticipate the future with undisguised anxiety. It has been well said that though men carry more of the wood, women carry not less of the worries of life. They *may* in some cases escape the physical toil which strengthens; they do *not* escape the mental toil which demoralises and kills spirit and energy if not body and

health. Now, though the brain tissues do not create mental activities, nevertheless we all know that they are conditioned in some inexplicable way by that organ. Derangement in any part of the brain deranges or diminishes its functions; non-development in any part of the brain can and does arrest mind growth. Chronic over-fatigue and exhaustion, anæmia however produced, the circulation through the nervous tissues of impure blood, alter the character of the mental processes. The results of starvation may so distort them, that the horrors of the French Revolution are attributed by some authorities to this particular cause. That the imperfect lymph circulation associated with adenoid vegetations accounts for much so-called stupidity is one of the first fruits of the medical inspection of school children; that a severe shock may destroy intelligence is a fact familiar to every expert in mental hygiene. If it were generally known to parents that every impression received by this, the most sensitive of all organs, is stored up from early infancy, albeit subconsciously, and can at some future time rise up into the field of consciousness, influencing both thought and action for good or ill, a very different line of conduct would be taken towards the persons or the places which make up a young child's surroundings and most indelibly impress his brain cells.

It is surely time, therefore, that some broad outline of the process of normal development of the whole nervous system should be possessed by

all in charge of children. Every mother, for example, should know that the movements of a new-born baby, such as the facial contortions observed during sleep, or the stretching and bending of the limbs in very young infants, involuntary and automatic in character, constitute the simplest form of nervous activity. They are the necessary precursors of that intellectual ability, to the development of which parental ambitions aspire, and should merge into more advanced forms of nerve and muscle co-ordination, which, rightly utilised, are invaluable agents in infant education.[1] An intelligent nurse possessed of even this outline could begin quite early that training in physiological righteousness and in the strict voluntary control of the whole group of emotional expressions, of which, as a little reflection will quickly show, good manners largely consist. Presently, as the brain cells are stimulated into function by nutrition and a quicker and more extensive recognition of external sensations is acquired, a child will perform instinctive movements, such as sitting, crawling, standing, walking, jumping and throwing. Though considerable latitude must be allowed for their wide individual variation, failure to display these evidences of mental progress should call for careful investigation. Later on, skill in a hundred different forms of muscular activity should be displayed; but many years will elapse before full control of the

[1] "Infant Education." Eric Pritchard, M.D. (Kimpton).

body in all its parts will be acquired, and more years still must roll by before reasoned control of the mental and moral actions is developed. The last years of this long period of development are, perhaps, the most critical of the whole ; though all depend for their favourable fruition upon an infinity of loving care and suitable provision for their appropriate activities.

There would be a marked reduction in exhausting disciplinary difficulties were every parent aware that, to the almost vegetative character of the first few post-natal months (when sleep will or should absorb at least twenty hours out of the twenty-four), will succeed a period of extraordinary activity, which lasts till about eight or nine years of age, when the mind is essentially an exploring organ ; imitative, impressionable, retentive. Every legitimate opportunity for the liberal gratification of these characteristics should be provided, as well as suitable surroundings for the eager, inquiring brain. Elaborate toys are not necessary, nor is premature book-learning permissible ; but freedom to investigate, to experiment, to test, to explore, is the child's urgent need, as well as suitable arrangements for the intervening periods of profound sleep. Repressed activity is often responsible for breaches of discipline ; so is insufficient sleep, following on over-excitement, accountable for "temper" and passions.

The next phase of growth is still distinguished by this continued capacity for and dependence upon muscular activity, but the mind becomes

more reflective, more productive. The power to initiate should develop during this stage of development, as well as increased power to control mental and bodily functions; and, throughout each of these periods, there should be a steady, unintermittent formation of good habits. At first, the nature of these will be chiefly physical; the habitual performance of the bodily functions should be safeguarded, until their neglect is attended by discomfort and their violation becomes almost painful. Then, by degrees, the moral and mental nature develops.

Thus is the child prepared for the stress and turmoil of the long and anxious years of adolescence; when, under the influence of new emotions, of fresh temptations, of unfamiliar powers, the character built on the sands of parental indulgence is undermined, if not swept clean away; whereas when built on the firm rock of good habits it emerges unshaken from the storm.

That childhood is an honourable estate must be now evident; pregnant as it is with possibilities, pathetic in the risks associated with its plasticity and dependence. Should it therefore be necessary in the twentieth century to point out that, when the fund of nervous energy is constantly exhausted by deficient sleep and poor food; when a demand on function in advance of what nature is prepared to comply with is persistently made, as it has habitually been in our schools; when exaggerated and pernicious stimuli are allowed to fatigue and to paralyse our child

population; when inadequate training in the right conduct of life is provided, and no information given on the dawning functions of potential parenthood; when premature responsibility is imposed or precocious and unwholesome independence is permitted; worst of all, when, through parental disease or alcoholism, the brain tissue is of too poor a quality to resist the strain of modern life—it is no matter for surprise that mental instability and insanity are on the increase, nor that degenerates hamper by their helplessness and crime the productive capacity of the normal.

The importance of mental hygiene calls for no more emphasis on my part; though, did space permit, further illustrations might be given of its scope. It includes the methods in our nurseries, the curriculum of our schools, the care of our adolescents, the increasing differentiation of our industrial processes, the character of our often miscalled recreations. It is concerned with the warding off of nervous breakdowns, and, with Goethe, it would call the attention of all women to the fact that the secret of rest is found not "in quitting a busy career, but rather the fitting of self to one's sphere." It views with anxiety the growing disregard of religious obligations and restraints, and emphasises the grave antenatal responsibilities of parents for their offspring; they who should be the most ardent advocates of a sound heredity, as well as the promoters of a good home environment for their children.

XIV. WOMAN'S RESPONSIBILITIES FOR HOME ADMINISTRATION

Thus, though the human constitution is still imperfectly understood, though its intricacies and the details of environmental influences are still mainly undefined, the women of every nation must nevertheless see to it that progress in the administration of the home keeps pace with modern demands for revised methods and less conservative practice, in order to give every chance of normal health to their occupants.

It is a serious reflection upon many housekeepers that the hall-mark of progressive civilisation, namely growth in power to organise, is generally absent from their domestic methods. The time will come when it will be to them a matter for the deepest searchings of heart that they are directly and inexcusably responsible for a mass of the disharmonies which disfigure the fugue of family life. The fact is too certain to be denied. Homes have not developed in proportion to the opportunities offered, and the chief opponents to progress have been their organisers. The economic link they form between the physical economics of the individual and the social economics of the nation has been unnoticed. Reference to the hygienic significance of due economy of time, of strength and of health, as well as of money, has hitherto been generally met with incredulous smiles; and though home has

been extolled as the place for children, how scant has been the attention devoted to their legitimate requirements, and how few demands for special training have emanated from, or been attempted by, those who have undertaken the sole charge of young lives during their most important and impressionable years.

The new movement, designed to foster the science and art of right living, cannot gain strength and influence unless it receives the whole-hearted support of the millions of women whose lives and energies are absorbed in the care of man's physical needs. It behoves *them* to recognise that intuition and tireless industry are insufficient qualifications for their imperial service, and they must themselves promote the substitution of systematic training for rule-of-thumb anomalies.

This training must be varied and comprehensive. No other profession is concerned with so many interests nor associated with more fateful responsibilities. For those who can afford the time, it should include a general acquaintance with the biological basis of life, and should further direct attention to the vast mental and moral endowments which give pre-eminence to our race. The products of literature and art and the records of natural and moral science afford ever present evidence of the extent of these endowments, and of the executive capacity associated with their utilisation.

Chemistry must play a prominent part in the training, were it only for the insight it gives into the

inviolable law of cause and effect! besides which physiologists tell us that the chief commerce of our bodies with their environment is chemical; therefore, this subject becomes an indispensable element in any comprehensive course of domestic training. Without a working acquaintance with the physics of water, of heat, or of air, a housewife is at the mercy of her architect, if not of her plumber and her servants. In the absence of an introduction to bacteriology she lives in constant perplexity over the vagaries of her larder; and is at a loss to understand the sources of fermentation or the methods of infection by the majority of known diseases. Without an insight into economics she is helpless in the hands of the advertiser or the vendor of patent preparations, all of whose wares are warranted to perform impossible feats with an infinitesimal expenditure of trouble. At their best these preparations are expensive, and at their worst they are injurious to health.

Some personal practice of the domestic arts is also advisable even for the wealthy; it is indeed essential to a right adjustment of the daily duties in a home, though naturally the degree of skill acquired will depend on the style of living. A study of hygiene in sufficient detail is of course imperative, and while it will remove difficulties by explaining common errors in diet, habits, and dress, it will be found materially to lighten labour. Finally, hygiene will render extraordinary assistance in the right rearing of children and in the general arrangements of family life.

The objections may here be advanced that the study of these scientific subjects is uncongenial to those whose temperaments are artistic or literary ; upon these people sanitary science has surely meagre claims, while life is not long enough for all to pursue such exhaustive studies. The reply to the first objection must be in the negative. There can be no health under modern conditions of existence unless those who assume responsibility in the affairs of men possess a scientific acquaintance with its right regulation. The subjects just enumerated are the very pillars which support the temple of Hygeia. But, for the encouragement of these complainants, be it added that the temple walls demand decoration ; the shelves must be filled with wholesome mental provender ; the gifts of both artist and author are therefore contributory to harmonious living, and an unlimited scope is offered to their utilisation. The building which shelters a healthy family, for instance, should be characterised not only by advances on existing provisions for convenience but by symmetry in its parts. The test of beauty (use, ease, and economy) can certainly not be passed by a large proportion of modern houses, neither do they provide the space which gives to each occupant "a chance to utilise his own gifts or to pursue his own hobby." Space needs in its turn regulation, for the saving of steps must be considered and compactness is essential. Decorations and furniture should also be suitable in form and colour to their purpose, not a mere heterogeneous confusion of

inappropriate colours and articles, out of tune one with the other.

The natural needs of normal children, too, must be more taken into account in the future than in the past, and the conveniences offered by scientific progress must be far more generally introduced into the most modest homes. Here is a huge field for intelligent, artistic work; for true beauty and real utility are near of kin.

It has been said that as in the world of life the localisation of function made the organ subsequently to become responsible for that function, so may the differentiation of labour develop individual talents, just as the exercise of our vital activities has led to the differentiation of parts in a house. Thus, as satisfaction of hunger is a first necessity, eating made the kitchen, where means for the gratification of this instinct were localised. By degrees the growth of men's social and intellectual demands led to the setting apart of a chamber for conversation; that is, the parlour. Storage of bread called the pantry into existence; increased refinement necessitated a scullery for the washing of cups and platters. Centuries, however, elapsed before the enlarging personality of the individual demanded privacy for the toilet and the right to isolate himself periodically from the bustle and publicity of group life. The general provision of separate bedchambers for each unit of a household is not even yet habitual, though most desirable in the interests of health. Reparation of the omission will mark a further

phase of social evolution, and will remove one disintegrating force now continually at work in home life. Here again the artist will most advantageously collaborate with landlord and with health authorities to devise means for the suitable satisfaction of this laudable demand.

Further objections to the adoption of any comprehensive schemes for training housewives of all ranks are found in the apparent want of time available for the purpose and the prohibitive cost incurred if the period of education be prolonged. The best answers to both objections are found in the movement now active all over Europe and North America to furnish more and fuller opportunities for this training, and to extend, not curtail, its duration. More than this: this movement, which generally originated in the desire to improve home life among the poorest, has recently extended itself just as generally to institutions for higher education, upon whose pupils and students its claims are now recognised. There is no suggestion, for instance, in Germany or England, Norway or the United States, of restricting the education of girls by this movement or of prematurely enforcing upon them technical instruction. The growth of public opinion is due rather to a belated realisation that the end of all education is the betterment of life, and that suggested applications to the practical concerns of daily life in the course of a girl's general education make for the sounder assimilation of theory by the pupil, and are thus contrived a "double debt to pay."

The progress of preventive medicine has also introduced another incentive to the diffusion of this training ; for it affords convincing proofs that the foundation of the national health is laid in the home. If, however, the foundation is permitted to be imperfect the edifice must necessarily be unstable.

Among other influences prejudicial to family life, the force of which was for a long time unsuspected, mention must be made of modern industrialism, the reopening of professional life to women, with its associated financial independence and the increasing seductions of society. For a century past the tendency has been to discredit housekeeping as an unsystematised occupation, which has emphasised the common and sometimes humiliating financial dependence of its representatives. The first nation to perceive the importance of stemming this dangerous tide was the United States, where conclusive demonstrations are now offered of the fact that intelligent housekeeping calls for a high degree of capacity, and that its problems demand the resources of a university for their solution. By the recognition of housecraft as a profession, American colleges accomplished even more than at first they anticipated. A satisfactory proportion of their students return to home life convinced of its scope and importance, and satisfied to perform the duties which there present themselves, instead of seeking outside occupations and divorcing themselves from family interests. The King's College Course for

graduate students in Home Science and Household Economics bids fair to exercise an influence of as satisfactory, though naturally of a slightly variant, character.

XV. THE FUNCTIONS OF THE HOME

If the functions of the home are briefly enumerated under three heads, no hint of exaggeration will attach to the assertion that by *its* atmosphere children are modified in soul and body, and that upon *its* outlook depends the ideals and health of all its occupants.

The first function of the home may be fitly defined as *Protective.* If its evolution be traced it will be found that home life originated in a craving for warmth, safety, and shelter; in the desire for a place where the weary could rest and where security from ill was assured. Physical comfort, sympathy and sanctuary are, or should be, primary characteristics of every home.

The second function of the home is *Educational.* It is largely responsible for the systematic formation of good habits, which should here be stimulated by example and precept, and every advantage taken of the imitative instincts so powerful in early life. Within its precincts care can be exercised to afford opportunity for the development of individuality; it is also, *par excellence,* the place for early training in the judicious expenditure of energy and in the acquirement of self-control. Such training

improves brain power, relieves nervous tension, and obviates the tendency to mental and moral confusion and disorderliness which is associated with its absence. In a good home the child's sanitary education should be fairly complete, at least in its main principles, before the infection of bad habits from without can interfere with automatic practice or weaken faith in home standards and conduct. Regular washing of the teeth, for instance, should be early inculcated, and rigid conscientiousness in matters of personal cleanliness :—external, by bathing, rubbing, and brushing ; internal, by strict daily attention to the bodily functions. Slow and thorough mastication of food should be cultivated, as well as good habits of posture, of enunciation, and of regular exercise. Last, but not least, habits of prompt and cheerful obedience, of truthfulness, and in due course of moral purity, must be wrought into the very fibre of a child's being. The discipline of home ought to be above all things consistent ; gentle, though firm and well considered. The virtues of obedience, of self-restraint, and of respect for others should become instinctive almost from infancy ; for they sow the seeds of physical morality in later life.

The third function of the home is *Social.* Before the present era of "only" children, the exaggerated individualism was uncommon, of which many of them are now unfortunately the victims. When large families were the fashion, the give-and-take in nursery and schoolroom

gave early training in the duty of participation in the interests, the pleasures, or the sorrows of others; it rubbed off the rough angles of selfishness and gave invaluable lessons in consideration for those whose circumstances varied from immediate individual experience. The wider social sphere, for which much of the rough and tumble of family life was an excellent preparation, was not familiar then to young children as it is now, when the modern child's premature introduction to its attractions is not only a constant source of physical detriment and of mental exhaustion, but tends to disguise its real character and to stimulate precociously the capacity to respond to its demands. Occasional glimpses of this larger life are a desirable part of home education; but constant familiarity with its excitements is to be sternly deprecated in the causes of health and of mental stability.

Where and when, then, are "only" children to receive this necessary social training, occupants as they are of solitary nurseries; or where are these qualities to be developed in the millions of children reared under circumstances of such acute overcrowding and poverty that the amenities of life are obscured by its fierce and exhausting conditions? Observation shows that the function of accomplishing this training is steadily devolving upon the school. Unfortunately, though the school *does* offer necessary opportunities for social intercourse, this intercourse is relatively of an advanced type, which presupposes

some previous training in the more elementary principles of community life, most fitly acquired at home. This tendency to force the school to *supplant* instead of to *supplement* home training must be resisted, as it involves loss to parents as well as to the children themselves.

The stress here laid upon the social function of the home may seem to some exaggerated, and its association with the subject of this paper may appear far-fetched ; but to the writer its pressing importance calls for this emphasis, for its connection with habits of sanitary practice within and without the home is of the closest. The social spirit is the very essence of sympathy ; it exercises the imagination, it widens the horizon, it quickens the sense of duty and of self-respect. If graduation through the school of domestic, social training be omitted in childhood, the realisation of personal responsibility is too often indefinitely postponed. Consideration for others, care for their welfare and personal sacrifice for their protection, must ever bulk largely in importance throughout life, and must always be associated with self-respect and self-control. When this sense of personal responsibility is habitual, conduct which makes for limitations of health in self, family, or neighbours will appear unjustifiable ; and neglect of either domestic or civic duties will become as unpardonable as it is unpatriotic.

But antecedent to the attainment of this ideal, fundamental even to its entertainment, is the adjustment or readjustment of home influences or

methods, as the case may be, to a higher standard. A better understanding of the constitution of those for whose welfare the home is established must also be insisted upon as an integral part of general education.

It may be wise to point out that no proposal to sweep away in wholesale fashion all the domestic traditions and family methods of this or any other phase of civilisation is even suggested. Apart from the impossibility of such a holocaust, treasures of great worth have been handed on to us by our forebears, of which the majority only need some slight readjustment to enrich many generations yet to come.

To take a somewhat extreme example. The mention of such homely, old-fashioned, domestic remedies as black-currant tea for a bad cough, or soap and sugar plasters for a boil—genuine relics from our grandmothers—now usually excite a smile of derision ; nevertheless they have been instanced by one of our most able living pathologists[1] for their admirable adaptation to their purpose, and have been shown to rest upon a hitherto unsuspected basis of physiological therapeutics.

Another illustration may be drawn from the nursery tradition that bad temper is often effectually cured by a dose of rhubarb.[2] Carefully con-

[1] "Studies on Immunisation," pp. 279, 462. Sir Almroth Wright, F.R.S., M.D. (Constable.)

[2] "Addresses and Proceedings of the National Education Association, St. Louis, Mo.," 1904, pp. 952–962—"The Chicago Hospital School for Nervous and Delicate Children," by Mary R. Campbell.

ducted observations upon children confirm the conventional connection of peevishness with disordered digestion. It has been found that gastric indigestion produces oversensitiveness, fretfulness, and irritability, while chronic constipation results in erratic conduct, stupidity, languor, headache, and moodiness. These effects may be so far-reaching that, for no other reason than chronic constipation, children may lose a large proportion of the advantages provided in school life; they may even run the risk of being classed as "backward," from the interference with mental progress of the food poisons reabsorbed into their circulation.

Modern methods of child training lay great emphasis upon the prevention of these or kindred conditions by early formation of good habits; or, when carelessness necessitates curative treatment, our old nurse's panacea of drugs is the last resort; the first consists in attempts to re-establish normal functions by the more natural means of suited food and special exercise.

It is time, too, that the so-called "hardening fallacies," responsible for the maiming of countless lives, were finally exposed and exploded. The idea, for example, dies hard that beneficial endurance is cultivated by exposure to cold; therefore, bare necks, arms and legs are lauded as means of developing a Spartan spirit in young children. Now no profound study of hygiene is required to demonstrate the close interdependence of warmth with growth and nutrition, or to show that the chilly

and underclothed, sedentary child is both stunted and starved; whereas the suitably clothed and freely active child is able to carry on unhampered the necessary processes of growth and development.[1] So important is warmth to the infant, that *eighty per cent.* of the total energy derived from its food is utilised for the maintenance of the body temperature essential to growth and for the activities of the organic and muscular systems.

Children, in accordance with the law of the relation between mass and surface in a cube, have, relatively to their mass, about thrice the body surface possessed by an adult. The greatest loss of heat occurs by radiation from the skin and by the evaporation of sweat, therefore undue loss from this extensive area should be prevented by its suitable covering; otherwise the child is placed at a far more serious disadvantage than would be suffered by an adult similarly situated; for in his case growth as well as equilibrium must be maintained. Few parents realise the further fact that the power of heat regulation is very imperfect at birth; indeed its slow development accounts for the instability of a child's temperature for many years after. The fallacy therefore of seeking to strengthen a young life by inadequate clothing, by enforced and prolonged inactivity, or by abstinence from the source of all energy—food—must be persistently exposed. Quite recently, also, Dr. Eurich has advanced evi-

[1] "Children in Health and Disease," p. 41. David Forsyth, M.D. (Murray.)

dence to show that the quality of sleep is adversely affected where the sleeper is insufficiently protected from cold, thus emphasising the injury to health associated with going to bed with cold feet.

All parents are ambitious that their offspring shall be distinguished by the energy, the stability, the endurance and the power which characterise the cream of humanity. The lives of young people are carefully planned with this object in view. The waking hours of most girls and boys are distributed in ordered sequence between what is intended to be concentrated work and vigorous more or less exciting play. But the fact has been very commonly ignored that these young people are built up of young cells, which cells are passing through almost every conceivable phase of instability in the course of development; consequently recurring periods of leisure and rest are as important to nutrition and nervous stability, more especially in the case of girls, as are the most elaborate arrangements for exercise. Thus it comes about that many youths and maidens suffer from chronic though unrecognised fatigue, while others are unable to employ pleasurably even a short space of "time to themselves," finding no interest in occupations from which excitement is absent. The habitual limitation of the hours of sleep among the rising generation is equally serious. The loss which would be unbearable,[1] says Dr. Acland,

[1] "On the Hours of Sleep at Public Schools." A paper read before the Medical Officer of Schools Association, May 11, 1905, by T. D. Acland, M.A.

even among our most favoured children, were it not for the indulgence permitted them during their long holidays. Is it not a parental duty to insist upon the necessary provision for rest being made in every school, and ought not inviolable rules upon the subject be laid down in their home circles? Sleep, be it remembered, is the property of animals possessed of brains and endowed with consciousness; it affords mechanical rest, and is accompanied by a respite from the chemical changes which are particularly rapid during childhood and adolescence. The intense activity of the child's waking hours must be counterbalanced by ample periods of entire rest. Habits of prolonged profound sleep are said to be the best investment against mental instability and insanity; yet parents permit a constant loss of from two to four hours' sleep each night throughout the long period of immaturity.[1] Our newspapers and lunatic asylums bear evidence to the price paid for this now inexcusable carelessness.

Many more examples might be given of similar fallacies which apply to later periods of life. How soon will a loving daughter allow herself to learn that the consumption of large quantities of highly nutritious food will not make for the prolongation of an aged parent's life? The fact that abstemiousness and rigid conformity to the "simple life"

[1] "Some Results of an Investigation into Hours of Sleep of School Children."—*International Magazine of School Hygiene*, vol. v. part i. Alice Ravenhill.

are not coincidents of longevity, but contributory to it, should be now common knowledge. When will the day come that the fact will be accepted that alcohol does not warm and protect the consumer, but actually lowers the temperature, and by this means, in cold weather, renders him a more ready prey to the effects of exposure. When will the value of good work cease to be measured by the exhaustion it brings about or the breakdown to which it conduces? Is it not, time that the housewife should be abashed rather than self-commiserating when a bad cold runs through her household, for observation of certain elementary principles of disinfection would go far to avert such a catastrophe? When will the fallacy be destroyed which gauges the strength of a disinfectant by the pungency of its odour? The knowledge now available on these and many other points only awaits assimilation by the housekeepers of the empire, to serve as a powerful lever by which to raise the standard of health in its every part.

XVI. HOME LIFE AN IMPORTANT SPHERE FOR SANITARY SCIENCE

The urgent call for a more intimate acquaintance with these tenets of domestic sanitary science calls for no further examples, though at the risk of wearying the reader one or two more may be selected to illustrate their claims upon every member of a household.

It behoves the householder, in the first place, to choose his dwelling with care ; and, in the second, to maintain the health of its inmates by his own conduct and by compliance with the requirements of public health enactments. He must be generally acquainted, therefore, with the essentials of a healthy home and with the obligations he must fulfil or the demands he may legitimately make upon local authorities and neighbours ; otherwise he cannot insure that his own care is not frustrated by derelictions of duty on the part of others. The selection and purchase of the family's food will probably devolve upon his wife, but it rests with him to insist that this food is produced, transported or distributed, with due observance of cleanliness, and that reliable protection from sophistication or adulteration is maintained. If conformity to necessary standards as well as the good quality of their products is to be safeguarded, the premises of dairy, bake-house, slaughter-house, laundry, market, and local purveyor of goods should come under his intelligent inspection. The surroundings as well as the conveniences of a house also call for careful consideration, especially when some of its inmates are of tender years ; and the reminder that to the provision for light and air in its rooms must be assigned a greater prominence than the mere prettiness of external elevation is still necessary. It is the householder who for some time to come must from his wider knowledge of economics personally safeguard his women-folk

from unnecessary exertion and chronic fatigue, by the provision of efficient fittings and equipment, by a judicious expenditure upon labour-saving devices, and by insistence upon adequate rest, recreation, and remuneration. To the graduate in the school of personal experience the duty of public service will next arise, in order that the advantages enjoyed in his own home may be extended to those for whom cheap housing must be provided. Civic claims must in the near future appear much more prominently than hitherto in the balance-sheet of duty.

The necessity for a study of child life and its requirements ought to be realised by both parents before the bitter results of inexperience have permanently shadowed their home. This should be pursued by the man as well as the woman before marriage is consummated, if their offspring is to be "well born" and well nurtured.

Maternal care is of course the more conspicuous during the first ten years of a child's life; but during the next fifteen, more especially in the case of his sons, it is the father's example, sympathy, and companionship which will steer them healthily through the stormy seas of adolescence, which will safeguard them from pernicious habits and will extend a helping hand in moments of temptation.

To enumerate the opportunities for hygienic practice by the prime organiser of domestic methods—the mother—is almost superfluous at this point. It is the foundation upon which

depends the welfare of each member of a household; for it is the housekeeper who plans the food and is responsible for its character and suitability to age, season, health, and occupation. It is she who superintends, if she does not carry out, the details of cleanliness, so arduous and discouraging in our great cities. It is she who selects the clothing of her family; who directs the order of their lives:—their work and play, their rest and exercise, their sleep and their habits. It is her place to shake faith in popular patent preparations, by good reasons and demonstrations of their exaggerated claims on purse and person.[1] It is her example which sets the tone in recreation, pursuit of hobby, or choice of literature. It is her infinite, understanding patience which cements breaches in family love; it is her skilful treatment which heals wounds, spiritual as well as physical. It is her privilege to devise better methods for daily doings and to appreciate the principles of sound economics. It falls on her to discourage futile expenditure of health, time, or temper; to be alive to possibilities of progress; to show by her deeds how profound is her faith in the dignity of a home-maker and her recognition of the extraordinary demands made by her profession on intelligence, moral capacity, and mental attainments.

It has been slowly dawning upon some minds for half a century at least that kitchen methods in many of their details fail to meet the require-

[1] "Secret Remedies: What they Cost and What they Contain." British Medical Association. "Popular Drugs: Their Use and Abuse." Sidney Hellier, M.D. (Werner Laurie.)

ments of sanitary science. The ordinary cook does not even suspect what cleanliness means from the laboratory point of view ; neither, alas ! does her mistress, in the case of 90 per cent. of middle-class housekeepers. Both alike cheerfully ignore the relative value as cleansing agents of boiling as compared with "scalding" water ; and refer to the broad shoulders of the weather or, quite frankly, to bad luck, the waste of food directly attributable to ignorant and uncleanly methods in market, purveyor's cart, or scullery. Yet no valid excuse can now be offered for ignorance of the real causes of the souring of milk, the tainting of meat, or the decay of vegetables ; neither is it permissible to entrust to the untrained the care of larder and refrigerator, except under intelligent supervision. It is of course a sign of progress that the modern housewife prides herself upon the delivery of the daily milk supply in bottles. But a quite superficial acquaintance with bacteriology would show the imperfect character of such a protection. The milk may still be poured by the cook from the unwashed mouth of a bottle, grasped, even if but momentarily, by the hand of a milkman, which shortly before was caressing his horse or serving him as a substitute for a pocket-handkerchief ! When the numerous uses of paper in the kitchen are considered, the advantage of a scientific acquaintance with its constituents and absorbent properties should hardly need emphasis. But the *laissez-faire* attitude, common in many households, permits

newspaper or brown-paper bags of questionable antecedents to be used indiscriminately for the lining of cake tins or the draining of fried foods. Should this be tolerated any longer?

A sounder knowledge of the risks to health associated with unwholesome food would surely check the growing disposition to purchase provisions over the telephone, instead of by personal inspection and careful selection; for the risks associated with stale vegetables or with "woolly" fish would be recognised, in the light of this fuller knowledge, as too serious to be encountered by any one responsible for the health of a household. Again, cold storage is so justly credited with the numerous and unquestionable benefits which it confers upon the housewife, that she is apt to forget the coincident dangers; only through tardily acquired experience does she become aware that foods which are thawed after freezing possess a singular faculty for rapid deterioration, and undergo subtle and detrimental changes when so preserved over a long period. No excuse for continued ignorance as to the changes responsible for such deterioration is now permissible; neither can it be condoned in connection with the "flora" of the refrigerator, now known to be accountable for the unpleasant and all-pervading flavours of the food stored in such a receptacle, and itself the product of defective cleanliness. The idiosyncrasies of different groceries, as regards temperature and receptacles, have hitherto received no attention, though the art of preserving fruits,

fresh as well as dried, is better appreciated than was formerly the case.

It would be easy to show, too, did space permit, what ample scope there is for the application of sanitary science in the storeroom, as well as the true hygienic inwardness of frequent coats of limewash in larder and scullery, not to mention the worth of impervious coverings to their wall surfaces and shelves. This suggests the inquiry : How many women to-day are versed in the external tests, simple as some of them are, which can be applied to tins containing foodstuffs, with the object of gauging the quality of their contents ; or who among our ordinary housewives understands the reasons for the employment of reliable, *domestic* methods of preserving the contents of the larder, such as sterilisation by the use of heat, or why fat, sugar, salt, or vinegar are preferable to the seductive yet questionable chemicals, so attractive to the producer and purveyor of provisions ?

A better understanding of the relation of sanitary science to daily life would also facilitate some of the painful steps which must inevitably be taken, in order to bridge the gulf set between the feudal methods of the past and the modern problems of domestic service. That the isolation from her kind of a "general" servant predisposes to anæmia is stated as a fact on good authority, but it is certainly not generally known. That absence of opportunity for recreation or social intercourse has led and may lead again to deception, if not

to worse, is recognised unwillingly, if at all. That human nature is physiologically similar, however diverse its external appearance and standards, is very hard to realise or to act upon; so the fact that suitable provision for bathing and wholesome sleep by dependents is not always made, is apt to be ignored on economic grounds; and the resultant complications are assigned to any but their real cause.

The solution of another of the acute problems of the day depends upon the women also of this country. I refer to the character of the influence, an influence of the most intimate, to which young children are subjected during infancy. In addition to vulgarities of conduct or enunciation, actual moral harm may be suffered from want of care in the choice of a child's attendant. Bad habits, impossible to eradicate, are to be traced to this source only. Their hygienic import calls for no further stress. Their prevention rests entirely with the child's parents.

Another illustration of the need for a better acquaintance with hygiene is found in the general custom of entrusting the preparation and care of the daily diet to empirically prepared, ill-informed, young women. Ascertained facts in connection with, for instance, "typhoid carriers"[1] should have surely created almost a panic in the households of England; but it is rare to learn that even one mistress has inquired into the personal

[1] "Human Carriers of Typhoid and other Zymotic Diseases."—*The Sanitary Record*, Sept. 8, 1910, pp. 215–216.

habits of her cook, or that she has concerned herself personally in the cultivation of most careful attention to necessary hand-washing by her household. A mere tyro in sanitary science would take warning and be on her guard against this and other disgusting and preventable sources of domestic infection.

Finally, the protective function of the home must not be allowed to obscure the educational and social. It is the right of all children to be trained in habits of social, as well as of family, sanitary service. Very early the love of ceaseless doing, by which these little people are distinguished, can be taken hold of as an agent in this department of education. Habits of neatness and order, of kindness and ready help, of self-sacrifice and self-control, become lifelong in their persistence and develop a physical as well as moral conscience which makes for public health. But, without appropriate stimulus this interest in others, this sense of civic obligation, remains in abeyance. Therefore girls should be encouraged in the educational practice of the domestic arts about the age of thirteen or fourteen; though instruction in the care of children may be postponed for a year or two. Always it should precede marriage and be adapted to the prospective social sphere of the pupils. It would be advantageous to foster the interest of boys in social sanitation by the introduction of some equivalent training into their curriculum.

Enough has been said to show that knowledge

of household administration must soon become an indispensable qualification for any woman who undertakes the charge of human lives, whether it be as wife or guardian, as official or philanthropist, as physician or educator, as head of an institution (such as orphanage, asylum, hospital or prison), or as almoner of public funds. To be practical and influential this comprehensive subject must be systematically acquired and securely based; it must be accorded the support of men, and it must receive the recognition due to its imperial importance. Thus sustained and fortified, acquaintance with all that is comprehended in the domestic administration for good of human lives will lead our women to redeem their many shortcomings in the past, and will stimulate them to assume with courageous confidence their weighty responsibilities in the present and future.

Whether prepared or not for their discharge, these responsibilities cannot be evaded. Upon their capable fulfilment depend human health and happiness. "Health and good estate of body are above all gold," said Ecclesiasticus, "and a strong body above infinite wealth." Seen in its true light this great, beautiful, responsible work becomes the highest form of consecrated service to the Source of all Life and to the Giver of all those good things which humanity is intended richly to enjoy.

MODERN WOMAN AND THE DOMESTIC ARTS

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MODERN WOMAN AND THE DOMESTIC ARTS

I. NEEDLEWORK AND DRESSMAKING

INTRODUCTION

MODERN woman finds herself in the twentieth century heiress to an accumulation of domestic experience handed down from her primitive sisters, much of which originated in necessity, and survives from custom.

It is said that "of the billion and a half human beings on the earth, about 700,000,000 are females, and what share their mothers and grandmothers, back to the remotest generation, have had in originating and developing culture is a question which concerns the whole race," though allusion only can be made to it in this paper.

If, from the study of anthropology, we find that man was the hunter, the killer of food, it was woman who cared for it, prepared it for use, tilled the ground, cleaned, dried, cut, and sewed skins for clothing and shelter. It is believed by many authorities that it was woman who invented and made many of the implements with which she worked, and who spun, wove, and dyed fibres of all

kinds into strong, useful, and sometimes beautiful fabrics of varied and pleasing tints and colours, from dyes of her own making, which she obtained from animal and vegetable sources. The introduction of much plain and ornamental stitchery, the forerunner of the needlework of the present day, followed quickly upon the coming of textiles.

Until the invention of machinery and the institution of the factory system, the practice of a large number of arts was in the hands of women as part of their lives and homes. Now, however, women are no longer leather-dressers, potters, or weavers in the home—these arts have become trades for men, carried on in factories ; and even the more intimate arts of cooking, cleaning, and needlework are threatened from the outside.

The cheapness and readiness with which the products of the factory can be obtained, whether for the purposes of food or of clothing, has to a large extent removed the desire to exercise these arts herself, especially from the woman whose time can be otherwise employed to her financial advantage in industrial pursuits. It would almost appear that she has failed to perceive the intellectual and æsthetic enjoyment to be derived from them, and has been content to permit the skill and knowledge she originally acquired and exercised to rust from want of practice as each generation succeeds its predecessor. On the other hand, as the accumulated profits from the factory have made it possible for well-off women to depute their own share of cooking, cleaning, sewing, and

the care of children by payments to their less financially fortunate sisters, usually untrained women of narrow education, public opinion has shown a tendency to regard these arts as menial, and to some extent derogatory in practice to the educated and refined. Amongst this class of women, consequently, knowledge of these arts has steadily dwindled, until the home-made jams, jellies, cordials and pickles of our grandmothers, the linen they spun, wove, and fashioned, are no longer the glory of our storerooms and linen-presses; while the home has come to be less and less regarded as the right and proper place for instruction in the domestic arts.

Deep down, however, in the modern woman's nature lies the old instinct for order, for caring for things animate and inanimate. This instinct has found expression since the early seventies among more fortunately situated women in an endeavour to arrest the decay of what I have called the more intimate household arts, to promote their revival and to raise their status in education—an endeavour due, shall we say, to "something in the air," a kind of "Zeit Geist"—beginning more or less contemporaneously on the Continent of Europe, in Great Britain, and in the United States and Canada; an endeavour not to benefit themselves alone, but to help their poorer sisters.

It was soon agreed that the cultivation of the household arts belonged to education, and that they might and should be taught in schools; but the questions—What was their link with general

education, by what methods they could be most appropriately taught, and in the curriculum of what schools they should find a place—have been the basis of prolonged experimental effort. It is now the opinion of a large section of persons of authority in education, that these arts are neither "sacred mysteries which can only be understood by patient life study," nor, on the other hand, can any woman, whatever her intellectual ability, master them without training. It has been well said, in effect, that the former attitude leads to a contempt for the plain everyday things of life, while the latter is responsible for the cultivation of a girl's head at the expense of her hands.

The arts of cooking and cleaning took the lead in order of experiment. The results, as recorded, have proved their position to belong directly to the region of applied science, and to be worthy of a place in a specially arranged course of household science and economics for women, of university standard. We may confidently expect that this result only anticipates a corresponding triumph, awaiting in its turn similar experimental work, which has been carried on for some years in respect of the teaching also of the art of needlework. These experimental efforts include the intelligent employment of the pencil, the scissors, and the needle in the production of garments, draperies, napery, and so forth. The lines along which at the present moment this development is proceeding have regard indeed not only to the practical worth of needlecraft, but to its intimate

association with general education as well as to decorative and applied art.

When we inquire what have been the results of past methods of teaching needlework in our elementary schools, and find that they are in no way commensurate with the time, labour, and money spent upon them, it surely is wise to call a halt and examine into our aims and methods. The circular of "Suggestions for the Teaching of Needlework" issued by the Board of Education in August 1909 is not the first authoritative pronouncement of the Board on this matter, but is the outcome of "the well-considered criticism" invited upon their "Suggestions" on the same subject issued in 1905, which teachers and others were asked to consider as a challenge to independent thought on the subjects of which it treated.

THE "PRINCIPLES" OF NEEDLEWORK

This challenge has resulted in the statement of certain important "principles" in the new circular and of the proper attitude of the teacher towards them, viz.:—

I. *The duplex aspect of needlework.*

1. As a separate branch of instruction, the aim of which is proficiency.
2. As a means to an end, other than (but not excluding) a certain proficiency, *i.e.* to develop the intelligence and even to form the character of the child.

II. *The subject must be made interesting* if it is to be educational. The making of specimens is not interesting, and should be discouraged, excepting for the practice of new stitches before they can be used on a complete garment or article, however small, for the child herself or for others.

III. *Correlation of needlework* with drawing and arithmetic in the higher classes.

1. To train the eye in form and proportion.
2. To illustrate principles of arithmetic, by measuring and deciding upon quantities and by calculating cost, introducing incidentally ideas of economy and thrift.

IV. *Needlework lessons are ordinarily uninteresting* and wearisome to body and mind. This need not and should not be; if the subject is taught with the why and wherefore of things, it should rather stimulate intelligence and capacity.

V. *Opportunity is afforded* by the lesson for practically and tactfully inculcating the charm of neatness, cleanliness, and tidiness in person and in clothing, encouraging the child in self-respect and to regard as a matter of shame that any girl should reach woman's estate without a practical knowledge of the use she can make of the needle.

Certain suggestions follow as a basis for a more detailed scheme, viz. :—

1. Classification of scholars as to age and capacity.
2. Size of illustrations and use of blackboard.
3. Instruction of weakly children, and care of eyesight.
4. Exercises in knitting and various forms of constructive handwork for very young children, in preparation for definite instruction in needlework at a later age.
5. Condemnation of habit of counting threads.
6. Order of teaching "processes" in needlework, from simple to complex.

7. Suitability of materials, needles, and threads to each other, and of the style of sewing to the garments which the children should wear.
8. Direction of attention to the fact that hands and eyes which have been sensibly trained to execute "plain work" will acquire "fancy work" quite readily later on if leisure can be found.
9. New methods and stitches to be learned on waste material.
10. Importance of practice in mending at school and at home.
11. Importance of cutting-out and pattern-making.
12. Garments made to be worn, not kept at school.
13. Elaborate making-up of paper garments to be discouraged.
14. Rough sketches to train the eye to recognise the value to each other of different parts of a pattern.
15. Importance of recognition of difference between a well-cut and an ill-cut garment.
16. Calculation of kind, quantity, and cost of material to be worked out in an arithmetic lesson.
17. Note-books and records to be kept.
18. Fixing to be done by actual maker of garment—not a joint production.
19. Use of sewing machine permitted for long seams and hems.
20. No time to be wasted while waiting for teacher's help. Independent work to be encouraged. Knitting and other suitable work to be at hand.

This excellent and sensible paper of suggestions means an offer of freedom on the part of the Board; it remains, therefore, but to accept and adopt its conditions. A practical difficulty, however, at once arises from the fact that, after a long period of bondage to many "Regulations," it is difficult for the teaching profession in general to realise that independent judgment is now expected

of them, indeed is required, though this is a phase temporary and evanescent, which will quickly adjust itself.

For lack of time and space we must here pass over the important question of the relation of the domestic arts to the general school curriculum, as well as the proportion of time to be allotted as between needlework and the other domestic arts, and dwell for a moment on the relative qualifications of our teachers in different sections of the whole subject taken at its widest, for these qualifications reflect the existing demands of the public. Taking England, for example—how do we stand with other countries in this respect? Speaking generally, and as one who, though not professionally a teacher, has for many years had a hand in the training of teachers, and who has given much time and thought to the comparative study, both theoretical and practical, of needlework and dressmaking, it seems to me that, as to sewing, we are as good, if not in some ways better than our neighbours, though we have been apt to regard the perfection of our stitches as an end in itself, which decidedly vitiates our conclusion. We also appear to have much to learn, or at least to practise, in respect of suitability of materials, needles, and threads to each other, and of the style of work to the purpose required. As to "cut" and "the hang of the thing," and the root difference between an "ill-cut" and a "well-cut" garment, I fear we make a bad third with France and Austria; but with our newly acquired freedom we can and

we must change all that: the public begin to demand it.

In the first place, we must clear our minds of the indefinite cloud of detail in which they have been so long submerged; or, to change the metaphor, whereas hitherto we have too often not been able to see the wood for the trees, we must now learn clearly to distinguish between "principles" and "methods," which in practice are over frequently confused: then, quite easily and naturally, the teacher will derive resulting details from the few definite principles which are the "basis alike of the simplest garment and the most artistic handicraft," and "the principles once understood, in one instance, the pupils will be able to make wider applications for themselves."

It is important here to emphasise that some elementary knowledge of hygiene, physiology, and anatomy is necessary for the intelligent appreciation of the requirements of the body as to clothing, and of its alterations in shape when muscles are tense or relaxed. By a reliable system of drafting from direct measurement, such as one of those in use in the Ecoles Professionelles of Paris, a shaped bodice can be produced fitting the arms and figure easily and gracefully, and from this pattern can be deduced further patterns of other garments, whether tight, loose, or semi-fitting, which hang from the shoulder or the waist.

When the theory of drafting has been learned, and the shapes and proportions of a pattern and its derivatives are understood, "moulage" or

modelling on the figure in muslin, should be attempted; though, be it remembered, "moulage" should not be regarded as a substitute for drafting, but as its necessary accompaniment, for it affords opportunity for eye training, and for learning how and where at certain points the material should be stretched or held easily on the figure. The pupil is thus prepared to handle the pattern intelligently when cut out in material.

I have seen it objected that only awkward and wooden lines can be obtained from drafting on paper because of its rigidity, and because the pattern is built up upon a framework of straight lines at right angles to each other. The objector cannot have understood that the rectangular construction lines have no connection with the outlines of the pattern, except as affording *points d'appui*, which are found by direct measurement. These construction lines stand for the warp and woof, or "thread" of the material to be used for the garment. Stress must be also laid on the fact that the grace or angularity of the pattern outline actually depend upon the eye training and perception of curves derived from drawing lessons, which must, for this as well as other reasons, form a part of the scheme of instruction.

CONCLUSION

Limits of time and space have only allowed me to touch the fringe of a fascinating and useful subject; but the frequent conferences of teachers now being held in different centres, and the new

suggestions of the Board of Education are stimulating so much interest and discussion that I feel that the educational teaching of needlework in its broad sense in England has a cheerful future. There is already much excellent teaching and work done in some of the trade schools in London as well as in a few of its elementary schools, and others elsewhere, which leaves little to be desired from many points of view.

Apart from the modern educational treatment of needlecraft and dressmaking, though arising directly from it, are the unquestioned advantages which may result to any woman of whatever rank or social position who is willing to devote, in the first instance, a little time and intelligence to mastering a few elementary principles introductory to their practical application, either by herself or by any one in her employment, to the cutting and making of her own garments from direct measurement, modified by measurements of individual carriage or conformation.

When these modifications are clearly understood, the proving of the flat pattern on the table after drafting should produce a well-shaped and correct lining, without the misery of standing for hours in the ordinary way to be "fitted on." If finer touches are needed, they are of the nature of "moulage," or modelling; the different parts of the pattern retain their balance and relative proportions, and the length of the operation is much shortened.

The majority of women, especially when past

youth, are not so happy as to possesss the theoretically perfectly balanced and well-proportioned figure which has been so successfully adopted by the best business houses as the basis for cutting high-class ready-made garments. Happy indeed is the woman who can "walk straight into them" without the offered "slight alteration" which so often spoils the cut and brings bitter disappointment to the wearer. There are few women who have not groaned under the waste of time and fatigue entailed by being "fitted on" under the hands of the "little dressmaker," or for that matter under hands of much greater pretension, with no idea of principles in cutting, who pinch and drag and smooth down by rule-of-thumb, producing garments without balance or ease, whose faults may be disguised by trimming or drapery, but whose discomfort is always present to the wearer.

Women have in fact so long submitted to this tyranny of rule-of-thumb in dress-cutting, as inseparate from it, that, as is their nature, they continue to endure what they think cannot be cured. Nevertheless, the discomforts and uncertainties of this rule-of-thumb misery may be entirely eliminated, and it is for the modern woman to demand and insist upon its elimination.

Let me especially recommend to ladies possessing the invaluable qualities in this connection of taste and style in dress, who may be thinking of taking up dressmaking as a profession, that as an important preliminary step they should master the principles of a good method of cutting. Let

them make sure that the method can lay claim to this description ; that it is reliable and not altogether empirical. Thus they will render themselves to some extent independent of the possible vagaries and misfits of their cutters and workers. The excellent courses of instruction now carried on in the trade schools already referred to should ere long create a supply of well-trained young women who will do their best work under an instructed head, and will be able to carry out intelligently her ideas and directions. Under such conditions there should be no room for failure in a business of this kind. As a result, the arts of needlecraft and of dressmaking will be raised to the plane of scientific certainty and success which is their due, instead of remaining at the often low level of the unorganised, empirical and inartistic occupations —a frequent source of financial disaster to their exponents and of perennial vexation to the helpless victims of their products.

MODERN WOMAN AND THE DOMESTIC ARTS—(*Contd.*)

By MAUD R. TAYLOR

II. HOUSECRAFT

THE position of modern woman towards matters domestic is somewhat undefined, and at best can hardly be considered satisfactory. Her attitude towards housekeeping is not one of enthusiasm. The Lancashire mill-girl is proud to have a house of her own, but prefers her life at the mill to one spent in ordering that house; the elementary school teacher considers housekeeping of so little economic interest that she is injured if she may not devote her married life to a profession demanding the best of her energy; the university graduate pretends to a mind superior to physical comfort and welfare unless it can be produced by a creature less specialised than herself.

In the field of paid occupations for women, educated and uneducated, domestic work stands low; not necessarily low in scale of payment, but uninviting as a sphere of work and lacking the dignity of skilled employment. That good housewives may be found in every grade of society is

evident, but the general trend of our social evolution demands that some organised effort shall be made to simplify actual work and to raise the appreciation of that work.

In history and philosophy, the moral advantages of a good home have been acknowledged and extolled. The physical advantages are only now being fully emphasised, and there is an ever-increasing demand that women shall diligently apply their best efforts, first to the problems of the individual household, and then beyond it to those forms of housekeeping that fall to municipal and national control. We need a different estimate, a better realisation, of the enormous responsibility that lies in feeding, housing, and general hygienic conditions, and such a realisation must work from the top downwards in our social and intellectual strata.

In the care of the sick we have seen a complete revolution. Even so recently as the days of our grandparents "Sarah Gamp" was the general refuge—now her name is a byword. The work of nursing and the care of an invalid's room, be it home or hospital, has been raised from mere manual labour. Intellect has established formulæ and dogma on which workers can be trained, and the work itself has been proved not alone a suitable means by which a woman can earn her living, but also a profession demanding a dignified respect and admiration. The researches of medical laboratories —the accumulated experience of the great physicians and surgeons of the world—are constantly

placing valuable knowledge in the hands of nurses and those who train them. Elaboration and fuss have gone in favour of a simplicity of service based on scientific facts; the influence of the trained worker has to some extent permeated the untrained service of home nursing. Great may still be our ignorance and great the need for a more adequate service, especially in the homes of the poor, but taken as a whole the care of the sick has been raised to what we may, without ambiguity, call a scientific art. Nursing may be popular from a love of such work and from its financial return, but the real strength of the nursing world lies in its orgainsed provision of skilled women sent out to their work with a knowledge of its detail and a training in routine, paid for by service during years of apprenticeship.

The changes that have been effected in regard to the care of the sick may not form a perfect analogy of what can be done in other forms of domestic work, but they at least constitute a lesson in cause and effect, with many suggestions for the would-be reformer. Improvement in nursing owes its first impetus to a realisation of the part a nurse must of necessity play in curing or alleviating suffering, and any real improvements in our general domestic work and conditions will only be seriously considered when they are properly appreciated in their relation to the health and efficiency of the nation. To bring this home to individuals and classes must be the work of education. Let us magnify the office of the

housewife unduly rather than leave it unrecognised. We must demand something more than mere manipulative skill from the manual worker—a knowledge and interest from those who direct her work ; a place in laboratories and schools for the many problems worthy of elucidation. To make lessons in housecraft a part of the curriculum of elementary and secondary schools has its own good ; to make lessons in sick-nursing also a part might be good ; but to leave both there would be only to patch, not mend, a rent in our social conditions. The matter must find its way into universities and research schools for its physical and economic investigation—as in other kinds of work we need an aristocracy of brains to guide the democracy of hands to found an apprentice-ship system that shall provide efficient workers to bring the mighty forces of chemical, physical, and biological science to bear directly on such matters as selection of foods, methods of cook-ing, better apparatus for cleaning purposes, and an evolution of house-planning and furnishing that shall reduce the present elaboration of service and cleaning. It is not possible that every woman who cooks a potato shall be intimately acquainted with the structure of starch-cells or the effect of heat on those cells, nor is it likely that we shall aim at a system that makes the cooking of our food as exact as a laboratory experiment, but that ther-mometer, microscope, and test-tube have their own part to play is evident. The use of a disinfectant by a nurse is a scientific operation, the scope of

which has only been made possible by many and careful investigations in which the specialised effort of the few has resulted in a definite formula and a handy preparation only to be used with intelligent appreciation of its purpose. She understands its use and abuse, how to adapt it to circumstances, and probably how to find a substitute for it if occasion requires.

It is much on these lines that many of the problems of kitchen and household interest must be attacked.

We need a simple and reliable classification of foods that shall be useful to the practical cook. A quantitative analysis of proteid or carbo-hydrate qualities of wheat, lentils, or milk may form excellent exercise for laboratory classes, but even there it is too often taught without any relation to the assimilative properties of the average digestion and their consequent effect on food values. For ordinary use we want all this brought to a general outlook of the value, and comparative value, of such ordinary food as bread, oatmeal, eggs, and beef; not only as to suitable proportions in our diet and to methods of cooking, but also as a help in providing suitable substitutes for a particular commodity in time of scarcity. Beyond the inevitable victims of the Irish potato famine, many suffered quite unnecessarily for want of ability to replace the familiar potato by a possible substitute; and to-day we are little more intelligent in our catering. Quantity and quality of the potato crop must

each year to some extent make itself felt on small purses, and while not dependent on this one article of diet we might often help a meagre table by a good substitute such as rice, hominy, dumplings, and an increased supply of fresh vegetables. Substitutes for butcher's meat too often suggest the purely vegetarian dish that to most people is but a *pis aller*. To replace part or even most of the meat in a dish with a food of approximate dietetic value would generally be more acceptable. A dish of haricot beans cooked with a little minced beef is, for example, a very different dish from the vegetarian treatment of the same article. Pea-soup made with the addition of a ham or beef bone will generally win approval over its less "tasty" rival. The value of eggs and the many ways of using cheese—the possibilities of oatmeal beyond mere porridge—are all matters worth understanding; so also is the problem of our milk supply.

The fact that legislation is active in securing the hygienic conditions of the wholesale milk supply cannot excuse individual indifference to either its actual value or suitable treatment. The inferiority of skim or separated milk to "whole milk" has been so emphasised that in many places a useful article is lying as a drug in the market. That skim milk is as useful as many "stocks" and much better than water for making porridge, maigre soups, sauces, for mixing bread and scones, has yet to be appreciated, and will only be so when the true economic use of food

is removed from its present haphazard position among the instinctive arts!

The constructive consistency of meat, fish, and vegetables must be clearly set out if we are to understand the effect upon them of heat. The primary methods of cooking and the standard proportions of ingredients may already be used with an intelligence that at least puts aside the recipe book; but the research that can produce a satisfactory system of catering and cooking has yet to invade the higher education of men and women. A suggestion of the scientific treatment of domestic matters too often presumes an elaboration of work rather than a reduction of it, and yet we all realise the labour-saving and economic return that has been the result of science applied to commercial industries. There must be a definite aim to simplify housekeeping and domestic work; the conditions of life have gone that made a women find scope for *all* her energy in administering the affairs of her house or in employing others to that end.

To the uninitiated the various culinary processes seem endless, and to arrive at a proper accomplishment of these is generally considered a matter of continuous practice. A better understanding of the matter readily shows that while many processes can only be perfected by repetition, there are even more that fall under science rather than art. Take, for example, the principles underlying the cooking of meat by stewing. This is surely a process where manipulation is *nil*. To make pastry

or bread we must have a certain practice in the manipulation to give the deftness (on which final success depends) in addition to any understanding of the principles involved; but with regard to stewing and many similar processes it should be possible to have one lesson made so explicit that the actual process was known for all time—the Irish stew of an artisan's home or the dainty entrée of the "Ritz" being only an adaptation of given principles to different foods.

In order to reduce primary methods to such business-like proportions, it is necessary to consider them in their effect on different foods, having due regard to texture and to the effect of a moist or a dry heat. It would be a matter of interest to know how the established methods of cooking meat and fish all really conduce to one end, viz. to soften the fibres by steam formed from their own juices. The rules for most methods of cooking these foods lead to this assumption, though nominally based only on a means of retaining these juices in order to save a valuable part of the food. The actual part played by the liquid in which foods are cooked is possibly very small, but not to be ignored; the presence of salt in the water in which beef or potatoes is cooked makes an appreciable difference in the flavour and probably in the food value. The relation of the fat used in frying to the food fried in it is too often quite misunderstood, and a dyspeptic patient consequently is ordered "no fried food."

To "fry in butter" sounds well, but it is

practically impossible; to *sauté* in butter at a temperature allowing some of the butter to enter the food, is quite a valuable method of cooking; but to raise the temperature to a point at which frying can be done is to char the butter. To fry properly, the food should be immersed in fat so hot that the outside of meat is immediately "set." Then allow the heating of the juices inside the meat to perform the necessary cooking. The immersion of the cold food soon lowers the temperature of the fat and makes continued immersion possible. The best kind of fat for this purpose and the relative temperature at which different fats may be used needs more investigation. At present for ordinary kitchen use we have no more reliable test of temperature than to venture a bit of bread and judge by result. One thing we may accept—frying is not a greasy or rich method of cooking. The fat used is merely a means of excluding atmosphere and cooking food at a high temperature; it bears no more relation to the food itself than does the atmosphere of the oven in baking.

This question of temperatures and their relation to the kind of food, as also to the various cookery processes, needs careful handling; we want not alone a definite dogma established on a scientific basis, but we want the means to apply it brought within easy reach—reach of a limited purse and a limited intellectual capacity, for we are not all scholars. There is no reason why a thermometer should not become part of our kitchen equip-

ment just as readily as that old sand-glass which regulated the boiling of an egg, but, before it is the case, many other matters must fall into line. It is probable that a careful investigation of the best means of frying, boiling, stewing, &c. would effect a considerable revolution in our household pots and pans. Is it impossible to produce a pan in which a given quantity of fat or oil should be easily brought to, say, 400° Fahr., and yet be unable to exceed that temperature? It would so safeguard expense from burning that the most delightful frying medium, olive oil, would be readily used by many people.

The matter of watching, and waiting, and judging the exact minute for certain operations takes far more time than is generally supposed, and the gloom surrounding the average kitchen range increases the difficulty. The cook who understands the use of double pans for oven and range has done something to save both time and anxiety, but it is evident that much more might be done to render many cookery processes almost automatic. The science that controls the production of such commercial products as biscuits, tinned foods, pickles, and jam, and turns them out to a uniform standard, is at present remote from the household kitchen. Such scientific knowledge has been produced at a commercial value for commercial enterprise. We need *our* problems brought into universities and colleges; into the channels where research is made public; into the laboratories of schools, where, if no wonderful result may be pro-

claimed, we have at least established a scientific method of approaching the work of kitchen, laundry, and storeroom. The ordinary teaching of the domestic subjects too often tends to magnify the difficulties in order to show how they may be overcome. The simplification of methods by classification would do much, and the evolution of possible devices for saving labour would do still more, to establish a favourable view of house-keeping. What is worth doing is worth doing well; but it is "doing" unnecessarily that spells drudgery.

Our attitude in considering household problems turns almost involuntarily to cooking, but the need for an intellectual grasp of matters domestic is equally potent in methods of cleaning. If the word "hygiene," which we use so glibly, were really understood and appreciated, the modern house-builder and furnisher would quickly be sent to swell the ranks of the unemployed, and we should demand construction and fittings which would minimise the problems of dust and tarnish, provide suitable storage for food, and allow cleaning to be simple, straightforward, and efficient. The advent of the vacuum cleaner is less valuable in itself than in the establishment of a new principle for dealing with dust, and one that may eventually revolutionise our house-cleaning. We need a simple appliance of equal scientific value to reduce some at least of the labour entailed in "washing-up." Pots and pans, plates and dishes may be economised in number by a careful

worker, but cleaned they must be, and the average "sink" of scullery or pantry is little removed from the pristine incompleteness of its first appearance. There is, in the cloisters of Gloucester Cathedral, a sink, evidently used by the monks of the sixteenth century, which is identical with those found in sculleries of to-day, and yet chemistry and physics have revolutionised our industries and produced all sorts of scientific methods for cleaning, lighting, and heating on a large scale. Perhaps when the same woman who takes a D.Sc. bestows some of her energy on the washing of dishes we shall get to something less primitive than washing each individual greasy plate with a mop or cloth. The only scientific treatment of "washing-up" used at present seems open to criticism, and is only suited to large establishments, but it should be possible to construct every sink with some sort of douche and general fittings suited to this work.

The question of the position of modern woman towards laundry-work seems to have resolved itself into one of income. If she can pay for the services of a steam laundry she does so. In the United Kingdom it is estimated that there are 30,000 public laundries, but we have yet to find one that can produce a list of charges within reasonable limits of a small income. In the homes that are run on incomes of £100 to £400 a-year, and where the laundry-work is done at the public laundry, the amount of "washing" must be small, or some other side of the expenditure must be seriously curtailed. Laundrying performed intelli-

gently and under suitable conditions is neither difficult nor unpleasant. To stand over a wash-tub rubbing each article by hand ; to strain every muscle emptying that tub ; to dry garments on a rail across a kitchen and iron them near a blazing fire is *not* intelligent, and can only be followed by women driven by custom to wash clothes at all. Perhaps in no section of household work are scientific methods within reach as in the laundry ; the existence of the public laundry and the rivalry of different firms has produced an open market for appliances of all kinds, and the exhibition of laundry utensils, machines, &c., has become an annual event. Though many of the inventions are destined for the "power" and general scope of the public laundry, there are always a number of home appliances to be seen ; many more would be adapted if there were more demand. Any real scope for these must rest in the first place with architect and house-builder. In the North of England it is usual to build a small "wash-house" to nearly every house, but the general construction of these wash-houses is such as to discourage any desire to use them. Only cold water is provided ; the boiler is arranged as a detached unit ; the possibility of a drying cupboard in connection with kitchen stove or hot-water cylinder is never considered, and the economical heating of irons is generally overlooked. The use of irons heated by gas, charcoal, and methylated spirit would be more general if these were more efficiently constructed and less expensive. The provision of electricity

at a cost within the reach of ordinary folk will simplify many things in laundry-work as in cooking and cleaning. Instruction is, to some extent, already available as to soaps, detergent solutions and bleaching agents. We need more appreciation of the part that may be played by the process of "steeping" and the minimum of handling with which clothes may be efficiently washed and finished. The profit and loss in the matter cannot be estimated only in labour, time, soap, and firing; the wear and tear of fabric in public laundries compared with home handling and the risk of infection involved must both be taken into account. If we make laundrying easy we do much to make a frequent change of garment possible to a section of the community inclined to economise in this direction, and we should probably make fashionable those household materials that may be consigned to a wash-tub, instead of paying a reluctant visit to the dry-cleaner—chintz, cretonne, and Bolton sheeting instead of serge, tapestry, and plush. We owe one debt of gratitude to the public laundry—it has raised a section of household work to the level of a skilled industry, though as yet there seems no system of apprenticeship that turns out the "complete" laundress.

For the limits of a short paper these matters have perhaps been treated somewhat discursively, but the object has been attained if, by the few illustrations selected, some attention has been drawn to the field of inquiry which lies open, and the urgent need for a definite application of scientific

minds to problems which, amid all the advances of this progressive age, seem to lag behind. The inclusion of housecraft as part of the curriculum of elementary and secondary schools may do much to rouse interest and overcome some difficulties of cooking, &c., but to any one familiar with these classes it is evident that their scope is very limited, if only for the reason that the teaching so often treats the work of housekeeping as an imitative art, based, for want of reliable scientific data, on rules and recipes that are practically organised tradition no more. In secondary schools, the introduction of laboratory work has opened up fresh possibilities of a more reasonable treatment of housecraft, for it is certain that, when teachers are properly equipped for their work, biology, physics, and chemistry (organic and inorganic) can be successfully taught along lines that bring within the scope of school science such matters as food and feeding, cooking and washing, fuels, heating, ventilation, and hygiene.

To teach chemistry and physics in the usual academic manner and then tack on a course of cookery and laundry-work at the end of school life cannot possibly be of the same value as the co-ordinated courses; we want scientific method even more than "science" for these schools girls, who shall so soon be the housekeepers and home-makers. We may say with Stevenson, "A dogma learned is only a new error—the old was perhaps as good; but a spirit communicated is a perpetual possession." For those girls who pass

on to a university or technical school we want an intelligence alert to all that may lie in further investigation of those problems suggested at school.

A certain jealousy may be pardoned that the possible evolution of housekeeping may be the work of women; the leaders of the "woman's movement" have so often spoiled their work by following the lines of men's activities and aiming at a goal essentially masculine. The things that go to housekeeping seem so intimately connected with motherhood and mothering that it must be hoped our most able women will bring their intelligence, their education, and their sense of national responsibility to the task of housekeeping—to the simplification of its problems, the reduction of the labour involved, and the organisation of the paid service. There is certainly scope for master-minds.

We touched on the organisation of the nursing service. If it is possible to duly care for the sick and at the same time train an efficient nurse, it is surely possible to provide proper service in the huge caravanseries of our modern life, and at the same time provide a suitable apprenticeship for the domestic worker. Good instruction at school, followed by one or two years of definite training in a hostel or boarding-house, should produce a class of skilled women workers who can be organised and employed on the same lines as those of the nursing service.

In many branches of labour the women are

ousting the men ; unless we can make good the present breach in our home bulwark and train our army of defence, we may find men ousting women in their own particular sphere.

America and Canada, realising that their coveted nationality must be founded on homes, have brought into their universities the "science of home affairs." England, in spite of the warning note sounded by inquiries into physical deterioration, infant mortality, and kindred evils, has been content with a *tradition* of good homes, and has so far done little more than provide a smattering of cookery lessons for elementary school girls.

There is, however, a promise of better things. One university college has made a venture into home science, and other universities would soon be at work if the necessary money could be secured. Oh, for some silver-tongued evangelist to cry in the ears of our philanthropic millionaires all that might be done for this country by bringing its *best* brains to consider the material things that go to the making of a good home!

THE END

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