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SCULPTURE AND PAINTING AS MODES OF
ANATOMICAL ILLUSTRATION

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II. SCULPTURE AND PAINTING AS MODES OF ANATOMICAL ILLUSTRATION

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The earliest known hand-drawings in manuscript representing details of human anatomy (from the twelfth century down to the time of Leonardo da Vinci) are of the most rudimentary and diagrammatic character and, for several centuries, reveal nothing but servile adherence to tradition. Before the advent of Leonardo, the finest figurations of anatomical structure were by-products of the advancement of the plastic and graphic arts. The question, "Did anatomy do anything for art?" has been conclusively answered by the late Dr. Robert Fletcher, in two essays of unrivaled scholarship, viz., "Human Proportion in Art and Anthropometry" (1883) and "Anatomy and Art" (1895). In Fletcher's view, the concept "artistic anatomy" should be replaced by "artistic morphology," its true content being physiology and external pathology, rather than the science of musculature. Our problem is: Did art, in the sense of sculpture and painting, do anything for anatomy? What such processes as free-hand drawing and engraving did for anatomy has already been exhaustively considered by Choulant himself.

Detailed investigation of this subject is of recent date. It has two aspects: (1) anatomical illustration without (didactic) intention, (2) anatomical illustration with intention. Most artistic productions bearing upon our subject fall into the former class.

Far back in prehistoric time, early man seems to have concerned himself with delineation of the surface anatomy of the human body, particularly during the glacial periods, when increased cold confined him to the caves. Representations of man and animal in the shape of carvings and statuettes in bone and ivory, sculptures in *alto rilievo*, line engravings on stone and bone, and mural paintings in polychrome, abound in all the caves of the Old Stone Age (Paleolithic period). Sculpture preceded engraving and painting. The earliest known representations of the human figure have been found in the deposits of the Middle Aurignacian period (40000-16000 B.C.). In 1908, Szombathy discovered, deep in the loess, at Willendorf, on the left bank of the Danube, a limestone statuette of a woman, about $4\frac{1}{2}$ inches high, representing a nude female figure of



STATUETTE FROM WILLENDORF (MIDDLE
AURIGNACIAN PERIOD)

massive proportions, known as the "Venus of Willendorf."¹ The gigantic breasts and buttocks (steatopygy) of the primitive woman are thrown into strong relief, the head is bowed over the breasts, so that the face is indistinguishable, the arms, ornamented with bracelets, are folded over the breasts, but the feet are missing. The hair is arranged in a cascade of curls, like the coiffure of later Egyptian and Grecian women. The physical habitus is distinctly negroid, that of Maupertuis' "Hottentot Venus," and probably the effect, as Osborn says, of eating large quantities of fat and marrow, in the sedentary life and confinement to caves incident to this glacial period. Other sculptures of the Crô-Magnon artists, such as the ivory Venus of Brassempouy and other statuettes fashioned out of the teeth of animals from Laugerie Basse and Mas d'Azil, the female figurines in soapstone and talc (one a figuration of pregnancy) from the Grimaldi caves near Mentone,² the female statuettes of Sireuil and Trou Magrite, are described by Osborn as prototypes of modern cubist art. The posterior steatopygy is absent, but the gigantic breasts and haunches are blocked out in truly cubist fashion. At Laussel, M. Gaston Lalanne found four bas-reliefs of the human figure sculptured on limestone blocks. Of these the most remarkable are a nude female figure, 18 inches high, with large pendent mammae and exaggerated haunches, holding a buffalo horn in the uplifted right hand; another female figure with the cowl or capuchin headdress of Brassempouy; and a figure of a well-formed, vigorous man, minus head, feet, and hands, apparently in act to bend a bow or hurl a spear.³ The latter, in sharp contrast with the female figure, is nowise corpulent, but suggests the straight flanks, narrow hips, and serviceable musculature of the athlete *par excellence*. Thus the passion for uncompromising realism in sculpture was already characteristic of Paleolithic man. The line engravings on schist and bone, representing horses, reindeer, bison, bears, rhinoceros, chamois, antelopes, birds, and plants, are also unmistakably lifelike, and the parietal decorations in polychrome, executed by Magdalenian man (16000 B.C.), and found on the walls of the caverns of the Dordogne and the Pyrenees, have the same startling realism. These mural paintings frequently convey all the semblance of "*le mouvement*,"

¹ For a photograph of which see Szombathy, *Kor. Bl. d. deutsch. Gesellsch. f. Anthrop.*, Brnschw., XI (1909), 87, or Osborn, *Men of the Old Stone Age*, New York, 1916, p. 322.

² S. Reinach, *L'Anthropologie*, Paris, IX (1898), 26-31, 2 pl.

³ G. Lalanne, *ibid.*, XXIII (1912), 129-49, 4 pl. Recently, P. Schiefferdecker in *Arch. f. Anthrop.*, Braunschweig, N.S., XV (1916), 214-29, gives a different interpretation of the last figure. He believes that the athletic man is not engaged in handling weapons but in protecting a woman from the aggressions of another man.

the ambition of modern artists. The fore and hind legs of galloping animals, such as those of running stags engraved on an antler from the cavern of Lorthet (Hautes Pyrénées), are exactly as we find them in our instantaneous photographs, an action unknown to all animal painters of later times.¹ The most striking of the rock paintings in red and black in the Spanish cave at Cogul (Lerida) represents a sacral dance of nine women around a phallic figure.² The women have pendulous breasts, narrow waists, flaring haunches, knee-high, bell-shaped skirts of recent fashionable type, and mantillas over the shoulders. The women depicted on the rock-shelter wall of the Alpera cave (Sierra Chinchilla)³ are steatopygous, with exposed breasts, flaring hips and bell-shaped skirts, strongly suggestive of the physical habitus and national costume of the Spanish *maja* or *gitana*. The same bell-shaped skirt is again found in the remarkable post-Neolithic figurines excavated by Sir Arthur Evans in the palace at Knossos (Crete), representing the primordial Mother-Goddess and her votary. The breasts in these finely executed figures are again exposed and anatomically correct in execution. The anatomy of similar human figures on Cretan and Mycenaean seals and signets is far cruder in representation. The Babylonian mother-goddesses sculptured in *alto rilievo* (Yale Collections) are comely figurations of the nude, usually representing the act of suckling, vague in outline but of gracious charm. The Egyptian paintings are commonly executed in profile, and with sufficient clarity of outline. In the bas-relief of the temple at Sakkarah in upper Egypt (1500 B.C.), the fact that the harp-players are blind, while the singers are not, is wonderfully conveyed by a simple indication *en profil* (Holländer). Earlier Egyptian statuary, from the Sphinx to such figures as the Scribe and the basalt head in the Louvre, or the bronze lady in the Athens Museum, reveals remarkable rugged skill in representing the human face and form, dwindling into mere academic elegance in the figures of the Middle and New Empires. All these figures, of whatever period, exhibit Lange's "law of frontality," i.e., they are always represented as gazing directly and rigidly forward, usually motionless, but even in walking, static, in that they rest solidly on the soles of the feet.⁴

Perhaps the earliest anatomical models constructed were the ancient Babylonian livers in baked clay, subdivided into squares and studded

¹ See S. Reinach, *Apollo*, New York, 1907, pp. 6-7.

² H. Breuil and J. Cabré Aguila, *L'Anthropologie*, Paris, XX (1909), 17.

³ H. Breuil, P. Serrano Gomez, and J. Cabré Aguila, *ibid.*, XXIII (1912), 556.

⁴ S. Reinach, *Apollo*, New York, 1907, p. 20.

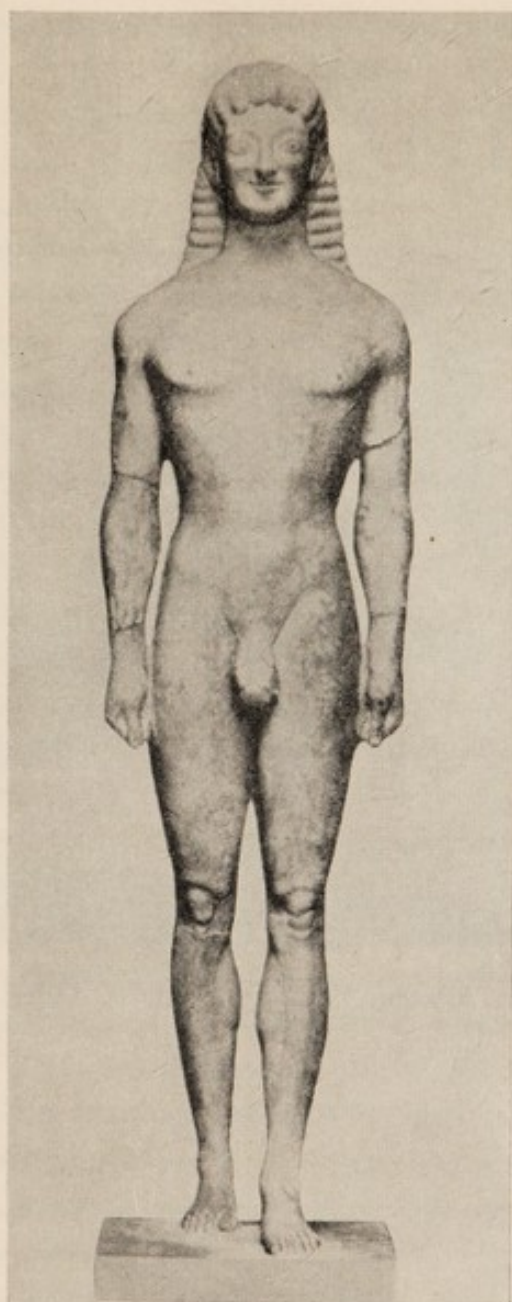
with prophetic inscriptions. Although these were used for purposes of divination (hepatoscopy), yet the nomenclature of the inscriptions and the configuration of the parts already implies considerable knowledge and study of didactic anatomy. The lobes, the gall-bladder, bile duct, hepatic duct, the *porta hepatis*, processus pyramidalis, and processus papillaris are all distinctly outlined, as Stieda has shown, and these specimens, viewed merely as examples of anatomical illustration in three dimensions, are far superior to the five-lobed livers of medieval tradition, as given in the *Tabulae anatomicae* of Vesalius. Similar models have been found on ancient Hittite sites in Asia Minor. Stieda describes an ancient Etruscan liver in bronze from Piacenza (third century B.C.) and another in alabaster from Volterra. All these models represent the sheep's liver.¹ The lore of Babylonian hepatoscopy is considerable. The figures of dancing girls, hewn out of solid rock in the temples of India, Ceylon, and the East Indies, are already splendid representations of the surface anatomy of muscular action.

The crown and flower of achievement in artistic representation of human surface-anatomy is that of Greek sculpture in the classic period, as Berenson says, "the creations of men with almost unrivaled feeling for tactile values, movement and the relation of the two." Here, in the words of Fletcher, "Art was far in advance of medicine. The noble works of Phidias and his contemporaries and successors were in existence long before the time when Hippocrates began the work of rescuing medicine from the priests and made his first imperfect sketch of anatomy." In the earlier period, sculptures in high and low relief, like those on the shields of Achilles (Homer) and Hercules (Hesiod), preceded the carving of statuary in wood and stone. Of early sculpture, such figurations as those from the temples at Selinunt (Palermo) and Gortyna (Crete) are grinning grotesques *en face*, suggesting the fantastic carvings of Japanese art. The earliest specimens of statuary, such as the Artemis of Delos (620 B.C.) or the Hera of Samos (580 B.C.), were evolved from the crude wooden images of godhead (*ξόανα*), stiff, rigid columns, without separation of limbs or eyes, which apparently derived immediately from the aniconic idols of post-Neolithic man. Of these the Niké of Delos (Athens), the Apollo of Tenea (Corinth), and the twin figures (Cleobis of Biton) of Delphi (sixth century B.C.), while still serio-comic in facial expression, have considerable anatomic merit. As with the Egyptian statuary, these upright nude figures again illustrate the Lange "law of

¹ L. Stieda, "Ueber die ältesten bildlichen Darstellungen der Leber," *Anat. Hefte*, Wiesbaden, XV (1900), 673-720, 1 pl.

frontality," gazing directly forward, singularly alike in pose, the attitude in both being exactly that of "attention" in our "school of the soldier." In the Apollo, the pectoralis major, deltoid, biceps, and rectus abdominis muscles are thrown into relief, the musculature of the forearm, thigh, and calf of the leg is well modeled, as also the bony conformation of the wrist and ankle; the flanks, hips, and prepatellar region are unmistakably masculine in character, suggesting already a keen, accurate vision for the surface anatomy of the body. Some observation of the workings of facial musculature is evidenced in the faint smile. The hair is worn long, falling in wavy cascades of curls, as in the coiffure of Aurignacian women. The musculature of the back, the gluteal, soleus and popliteal muscles are well differentiated in the rear view, and Hyrtl's dictum that grace and poise in statuary depend, in the last analysis, upon the sculptor's exact or intuitive knowledge of underlying bony structure is already borne out in these figures. The bronze statues of Harmodius and Aristogeiton (Naples) by the Attic sculptor Antenor (510 B.C.), representing two gigantic figures in the attitude of combat, have the same anatomical merits, the muscles being thrown into sharp relief by the movement of the figures. The decorative figure-paintings on vases of this period are mainly grotesques, suggesting Persian or other Asiatic affiliations.

Greek art in the time of the Persian Wars (500-479 B.C.) was that of a period of transition. The temples erected to the gods were built of marble, instead of wood or limestone; the differential characters of sex and the external appearances of the joints and veins were better featured on the vases, and linear perspective was mastered by Cimon of Cleonae (Pliny). Sculpture, however, lagged behind, and was still in the tentative, experimental stage, feeling its way toward perfection. Molding in bronze was more highly specialized, since the reflection of the light, absorbed by translucent marble, required closer attention to surface details. The athletic bronze Apollo of Lord Strangford (British Museum) brings out the pectoral muscles, the ribs, and the masculine character of the hips and lower extremities with great clarity. The special details of bronze statuary, in which the artists of Aegina excelled, in particular the armor, weapons, and hair, were made separately and fastened to the figure. Similar details in bronze and lead were also attached to the marble figures. The finest examples of figuration in marble in this period are those which adorned the east and west gables of the Doric temple of Aphaia at Aegina, acquired by Ludwig I of Bavaria after their discovery in 1811, and restored by Thorwaldsen. Excavations made by



APOLLO OF TENEA (CORINTH) 600 B.C.



FIGURE FROM THE APHAIAN TEMPLE AT AEGINA (FIFTH CENTURY B.C.)

Adolf Furtwängler go to show that this temple was erected after the battle of Salamis (480 B.C.), in which the Aeginetae bore away the palm for bravery. Of the thirteen figures on the western gable, ten remain; of the eleven larger statues on the eastern gable, only five. These decorations consist of a central figure (Athena) with symmetrical arrangements of warriors in combat on either side. The poses of these athletic figures afford the best opportunity for the exploitation of muscular anatomy. The kneeling Hercules, on the eastern gable, for instance, in act to discharge an arrow from a bow, reveals remarkable empirical knowledge of the effect of bending the knee and elbow-joints upon flexure and extension of the muscles of the extremities. The prostrate wounded warrior at the corner of the eastern gable, lying on his side in a semiprone posture, displays the same tendency. The figures are all nude, not that warriors actually exposed the unprotected frame to the enemy in this way, but because nudity was the "festal costume" at the athletic games from 700 B.C. on. When we reflect that Greek sculptors acquired their knowledge of the surface-anatomy of the body, the effect of rest and motion upon its musculature and its underlying bony framework, not from dissection, but from empirical observation of athletes in action during games and military exercises, the achievement seems all the more wonderful.

In the period between the Persian Wars and the age of Pericles, Athenian sculpture and architecture progressed by leaps and bounds, and the Attic drama attained its height. The temples of the gods, destroyed by the barbarians, were rebuilt in a spirit of piety and sincere gratitude. The temple of Zeus at Olympia (completed 457 B.C.) and the Siphnian and Athenian treasuries at Delphi were erected in this period. The metopes of the Olympian temple, particularly the friezes representing the twelve labors of Hercules and the battle between the Centaurs and the Lapithae, were executed with great power and distinct realism as to musculature and other details. In the compositions of the great sculptors of the period—Calamis, Myron, Phidias, Paeonios, Alcammenes, Polycletus—greater artistic freedom was attained, particularly in the expression of momentary attitudes. Calamis, Myron, and Polycletus worked in bronze as well as marble. The chryselephantine statues of Athena by the Athenian Phidias (born *circa* 500 B.C.) were celebrated in the writings of Pausanias and others, and the sculptures of the Parthenon—the metopes in *alto rilievo*, the friezes in *basso rilievo*, and many of the figures in the round of the pediments (now famed as the Elgin marbles)—were either modeled by him or executed under

his direction. Of these, the Moirae, the Theseus, the Poseidon, are splendid examples of massive modeling from the half-draped and undraped nude. The characters of his seated Zeus in the temple of Olympia are sensed in the majestic head in the Carlsberg Glyptothek (Copenhagen). The Marsyas and Discobolus of Myron are remarkable for bold movement, and here the "law of frontality" is totally abolished. The Aphrodite of Myron was admired for its grace and beauty. The winged Olympian Niké by Paeonios (454 B.C.) is a splendid semidraped nude.

Polycletus, the Peloponnesian rival of Phidias, whose Amazon (Vatican) and other statues introduced the new motif of resting the weight of the body on one foot, was only excelled by Phidias in grandeur and excelled him in finish. His Doryophorus (Naples Museum) was called the "Canon," on account of its just rendering of human proportions. The wonderful power of first-hand observation of anatomical structure possessed by the sculptors of the age of Polycletus is evinced in a torso from the metopes of the friezes of the Argive Heraeum at Argos. This figure represents a nude warrior youth in violent contest with an Amazon. In the groin is a curious hernia-like protrusion, which, as Waldstein proved by dissection and by throwing a well-developed athlete into the same posture, is nothing less than the forcibly contracted pectineus muscle, not visible in repose, being hidden at the bottom of Scarpa's triangle. This muscle, which was highly developed in Greek athletes, has escaped the attention of modern sculptors, as also a well-defined line running from the groin to the ilium, which is found in all antique statues of the athletic prizemen.¹

The pupils of Phidias, the gem engravers and the painters (Polygnotus) represent the last stages of the transition from the splendid dignity and repose (*ethos*) of the older masters, the static expression of physical power, to the newer *pathos*, which conveyed the impression of pain by muscular contraction of the body and face. The older artists avoided the expression of active emotions,

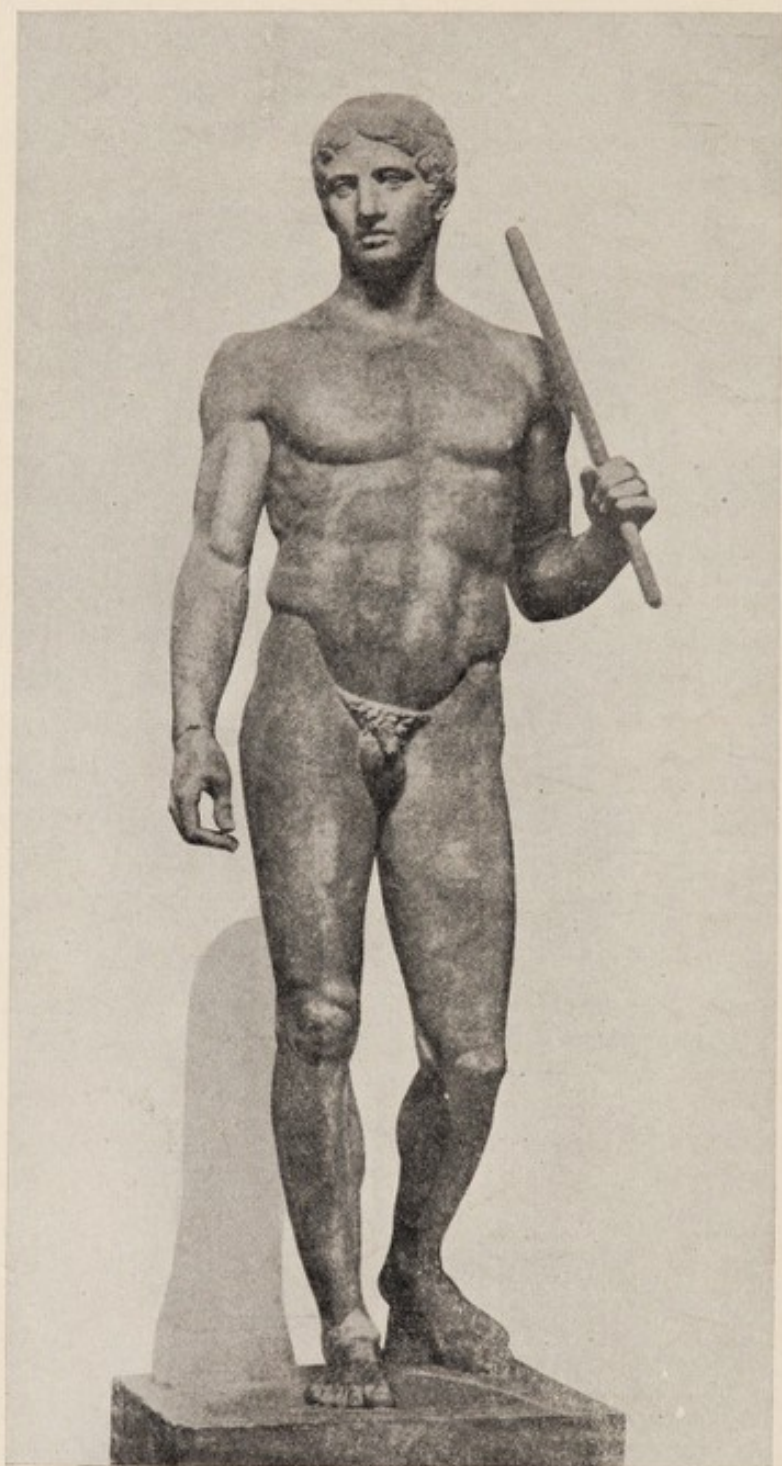
For the gods approve
The depth and not the tumult of the soul.

Pathos, passion, and movement were the newer ambitions of the Periclean and post-Periclean sculptors—Cephisodotus, Praxiteles, Scopos, and Lysippus, and particularly of the painters, Zeuxis, Parrhasius, and Apelles. In the beautiful draped Irene of Cephisodotus (Munich), the influence of Phidias is still apparent. The Hermes, Kore, and

¹ Sir Charles Waldstein, *The Argive Heraeum*, Boston, 1902, p. 186, pl. 30 and 34.



THE NIKÉ OF PAIONIOS (*circa* 420 B.C.)



THE DORYPHORUS OF POLYCLETUS (FIFTH CENTURY B.C.)

Cnidian Aphrodite of Praxiteles, the Apoxyomenos and Medicean Venus of Lysippus, the Milesian Venus in the Louvre have still immortal repose, suggesting physical dignity (*anima*) rather than passion and movement (*animus*). The heads of the Tegaean Temple (Athens) and Heracles (Florence) of Scopos express passion and suffering, while the Borghese warrior of Lysippus (Louvre) is thrown forward in a violent attitude of combat. The sculptures of the Alexandrian period (323-146 B.C.) were mainly character studies executed for the Roman conquerors. The Farnese Bull and the Laocoön (Vatican), both of the Rhodian School, are supreme examples of the expression of pathos and emotion by means of violent muscular movement. The Samothracian Niké in the Louvre, the Niobe in the Uffizi (Florence), and the Demeter of Cnidos (British Museum) are majestic expressions of the draped female figure. The Dying Gladiator in the Capitoline Museum and the Dying Giant (Berlin) are the best-known examples of the School of Pergamus. The sculptures of the newer Attic School, such as the Venus Genetrix and Felicitas of Arcesilaus, show greater elaboration of detail, but have little to say as modes of anatomic illustration, the actual Roman sculptures even less.

In the ancient Greek world, it was customary for those who had escaped some disaster or who were desirous of averting it to dedicate to a god an *ἀνάθημα* or votive offering in token of gratitude or anticipation of favor. These *anathemata* were usually statues or images of objects, the latter sometimes graven upon a stele. In the temples of Aesculapius, these *ex-voto* images were suspended by those who had recovered from illness or wounds, through the cures rendered by the god during the rite of incubation or temple-sleep. In the Roman civilization, the cult remained the same, and was carried over into Latinized Christianity, even through the Middle Ages. The Roman votive offering was a *donarium* or oblation, such as the clothes of the shipwrecked person in Horace, suspended on a votive tablet to the god of the sea. The *ex-voto* figurations in the medical cult represented all parts of the body—heads, eyes, ears, arms, legs, hands, feet, female breasts, male and female generative organs, viscera or a torso of the chest or of the opened abdomen with the inclosed viscera.¹ Most of these objects are rough and faulty in execution, and of little moment as examples of anatomical illustration. The best are unquestionably those representing coils of intestines. The oldest medical *ex-voto* known is a stone object from Mycenae (600 B.C.),

¹ See E. Holländer's *Plastik und Medizin*, Stuttgart, 1912, pp. 175-235, and Sudhoff, *Beilage z. Allg. Zschr.*, Augsburg, 1901, No. 140; *Zschr. f. Balneol.*, V (Berlin, 1912-13), 461-67.

in the Schliemann Collection at Athens, representing a coil of intestines, with a smooth base, provided with bored holes for suspension.¹ There are signs of strangulation, but the mesenteric or omental attachments are not represented. This three-dimensional figuration is superior, in sheer realism, to the pictures of the same objects in the *Fabrica* of Vesalius (1543). Many of these *ex-voto* objects have been found in the Asclepieion at Athens. In the Hieron at Epidauros, a marble votive tablet representing the ears of the Gaul Cutius, was discovered. Votive eyes and breasts are most common among the temple objects. Hovorka describes two inscribed Lydian stelae of 236 A.D., representing eyes, legs, and breasts.² Girard notes 110 votive eyes from the Asclepieion at Athens. The Berlin Museum possesses *ex-votos* of Pentelican marble from the Acropolis at Athens representing eyes, a breast with nipple, and a torso of the female pelvis, also a pair of breasts from Paros. A highly decorated Greek vessel in clay, in the Villa di Papa Giulio at Rome, has the form of the human astragalus.³

The cult of medical votive offerings existed also in ancient Etruria, and the most important objects excavated are from the Etruscan cities, notably Veii. Others come from Capua, Nemi, Città Lavinia, Terracina, the Isola San Bartolommeo in the Tiber, and the temple of Minerva Medica in Rome. The city of Veii, the ancient enemy of Rome, was destroyed by Marcus Furius Camillus in 396 B.C. The cult of Aesculapius was introduced into Rome in 291 B.C. These dates fix the approximate period of the early Italian *ex-votos* in baked reddish-brown terra cotta, sometimes painted red. These *donaria*, first described by Ludwig Stieda (1901)⁴ and Gustav Alexander (1905),⁵ represent all parts of the body. The most significant for our purpose are those representing the exposed viscera of the thorax, abdomen, and female pelvis, coils of intestines and other isolated organs and viscera. It is known that post-mortem sections and dissections of the human body were never made by the ancients, for theological reasons. The exposed *situs viscerum* in these votive objects represents such knowledge as was gained from the Haruspicina, or inspection of the viscera of domestic animals at the time of sacrificial slaughter. The representations are therefore

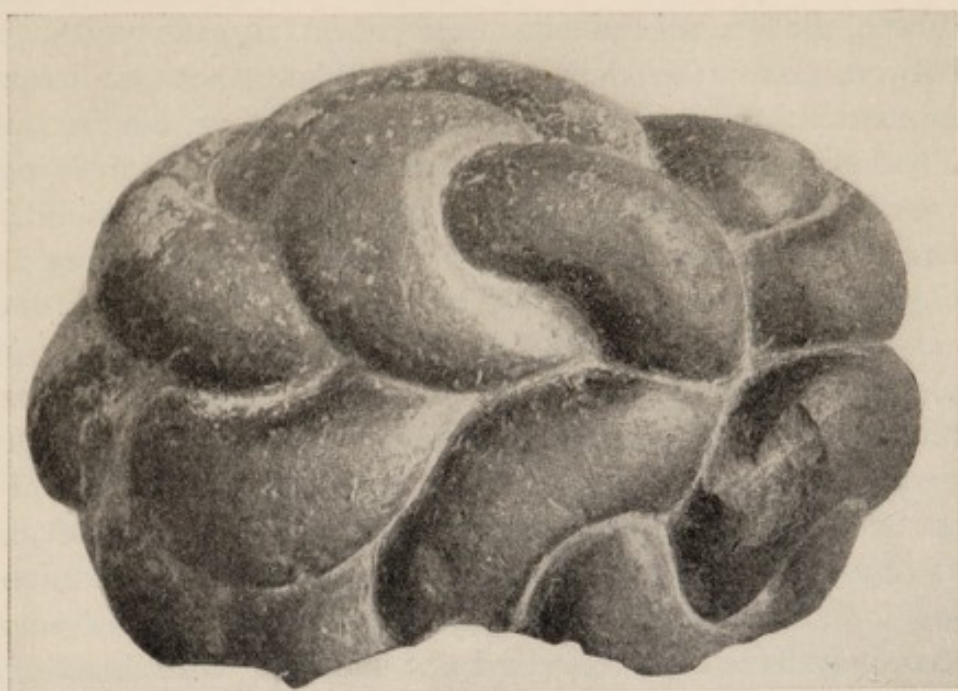
¹ Holländer, *op. cit.*, pp. 211-12.

² O. von Hovorka, *Wien. med. Wochenschr.*, LXIII (1913), 958.

³ Holländer, *op. cit.*, p. 189.

⁴ L. Stieda, "Anatomisches über alt-italische Weihgeschenke (*donaria*)," *Anat. Hefte*, Wiesbaden, XVI (1901), 1-83, 4 pl.

⁵ G. Alexander, "Zur Kenntnis der etruskischen Weihgeschenke," *Anat. Hefte*, XXX (1905-6), 155-98, 4 pl.



COIL OF INTESTINES (*Ex voto* FROM MYCENAE)



Ex voto FROM MUSEO DELLE TERME

rudimentary and sometimes inaccurate. The trachea is a definitely segmented tube, the lobes of the lungs were known, also the position of the heart between them; the stomach and coiled intestines were frequently well represented; the existence of the spleen, kidneys, bladder, uterus, vagina, and external genitalia is clearly indicated, but the liver is represented as three-lobed and no trace of the oesophagus is found. The intestines are frequently delineated as a mere wriggling line in two dimensions, like the trail of a serpent, but of the so-called *budelle*, or coiled intestines in three dimensions, admirable specimens exist in the Museo nazionale and the Museo dei Fermi at Rome. These are comparable with the isolated intestinal coils in Vesalius (*Fabrica*, 1543, 361; 1555, 562).

Apart from the medical donaria, there are a number of ancient marble sculptures which, from their nature, we may assume to have been employed for medical instruction. That such specimens of anatomic illustration may have been conceived and executed with didactic intention may be inferred from a note in Pausanias concerning the bronze skeleton at Delphi, dedicated to Apollo by Hippocrates. Such skeletons were more often as not, larvae, i.e., images of dried skin and bone with the bones thrown into relief, as in the medieval Dances of Death; but the miniature skeletons in bronze from Imola, described by Lovatelli (1895), are so exact in execution that there can be little doubt as to their probable usefulness in teaching anatomy. The marble skull in the British Museum (London), said to have come from the grotto of Tiberius at Capri, is thought by Treu¹ to belong to a late period. The most remarkable of these sculptures with presumable didactic intention, is an unusually well-executed marble torso in the Vatican, representing the thorax, with clavicle, sternum and the twelve ribs.² Nothing is known concerning the provenance of this fine torso, beyond the statement of Visconti (to Charcot) that it was found, along with various inscriptions relating to medical slaves, in an evil quarter of Rome, near the Via Aestensis.³ The scientific accuracy of representation suggests didactic import. Helbig regards it as a donarium. Braun and Alexander believe that it was fashioned after an anatomical preparation, in Charcot's phrase, "*une sorte d'anatomie plastique à l'usage des médecins.*"

¹ Treu, *De ossium humanorum larvarumque apud antiquos imaginibus*, Berlin, 1874, cited by Alexander.

² Holländer, *op. cit.*, p. 187. Charcot and Dechambre, *Gaz. hebd. de méd.*, Paris, IV (1857), 513-18.

³ Charcot, *op. cit.*, p. 515.

Stieda regards it as an ornament of a tomb.¹ Visconti attributed it to the age of Augustus, but it may belong to a very late period, since similar figurations of the chest are still used as votive offerings in Tyrol and Southern Germany. Another marble torso in the Vatican, first described by Charcot and Dechambre,² was excavated on the site of a villa which is said to have been the residence of the physician Antonius Musa. It represents the exposed thoracic and abdominal viscera. The heart lies vertically in the central plane of the thorax, as in Galen's description, and is therefore the heart of the lower apes. The left lung has two lobes, the right three, as in various apes, and representation of the stomach and intestines is faulty. As the anatomy of this "*splanchnologie en marbre*" is inferior to the anatomy of Galen, Charcot attributes it to an earlier period. Veit³ describes an Etruscan *ex-voto* from Veii, a female torso in baked clay, acquired from the effects of Count Vespignani, the director of the papal excavations made at Veii under Pius IX. A spindle-shaped opening in the abdomen contains the exposed thoracic and abdominal viscera, the heart, lungs, three-lobed liver, stomach, intestines, and bladder, in succession downward, with spleen and kidneys on the side. This, Stieda states, is more complete than any other Etruscan *situs viscerum*. From the character of the coiffure of wavy hair, reaching to the shoulders, which was the fashion in the time of Julia Domna, wife of the emperor Septimius Severus (193-211 A.D.), this *ex-voto* has been attributed by the archaeologist Bulle to the period of Galen (131-200 A.D.).⁴ Gustav Klein points out that this visceral representation corresponds closely with some of the bloodletting manikins of the Middle Ages and with the pictures in Mundinus.⁵ It is, therefore, within the range of possibility that these visceral representations in marble and baked clay may have been ultimately transferred to paper to become the originals of the earliest known anatomic illustrations in two dimensions, as seen in the hand-drawings of the Middle Ages.

In this connection, an interesting question arises, namely, as to the provenance of the figurations of skeletal and visceral anatomy in the medieval Books of Hours.

In ancient Egypt and in the later Roman period, small skeletons in wood or metal were used as Epicurean *memento mori* devices at feasts,

¹ G. Alexander, *op. cit.*, pp. 191-92.

² Charcot and Dechambre, *op. cit.*, pp. 515-18. Alexander, *op. cit.*, pp. 191-93.

³ J. Veit, "Ueber ein Weihgeschenk aus Veji," *Sitzungsb. d. phys. med. Soz. zu Erlangen*, XXXVI ([1904] 1905), 43-46.

⁴ Veit, *op. cit.*, pp. 44-46.

⁵ Veit, *op. cit.*, p. 44.

reminders of the brevity of human life. Those engraved on the silver wine cups of the Boscoreale treasure in the Louvre (first century A.D.), some of them representing the "shades" of departed philosophers, are unusually realistic in execution. But as Lessing (1769)¹ and latterly Parkes Weber² have shown, the skeleton was never used by the ancients to represent death itself; these serio-comic figures were merely employed at banquets with the usual *carpe diem* intention. Among the ancient Greeks, Death was figured as Thanatos, a winged black-robed figure with a drawn sword, or associated with Hermes Psychopompos, the conductor of souls to Hades, with Hermes Psychostates, the weigher of souls, or with the winged sirens on vases and sarcophagi. On various clay oil flasks (*lecythi*) in the British Museum and elsewhere, Sleep (Hypnos) and Death (Thanatos) are represented as bearing away the body of Sarpedon to Lycia (*Iliad* xvi. 671-83).³ Dancing and tipsy skeletons abound even on vases and wine cups of the Mycenaean period; all have an unquestionable Epicurean significance. In the *Ars Moriendi* or the Holbein "Dance of Death," similar skin and bone devices occur (the *Hautskelett* of the Germans), but these now signify Death as the medieval King of Terrors. In the same period appeared the *Horae Canonicae* or *Books of Hours*, which are illustrated not only with spectral skin-and-bone skeletons of the Holbein type, but also with corpses showing the dissected viscera. Now, even as the fearsome Holbein skeletons have no possible kinship with the amiable serio-comic skeletons of the Graeco-Roman period, so it is fair to assume that the eviscerated figures in the Books of Hours had some other provenance than the marble and terra-cotta donaria of that period. With anywhere from ten to seventeen centuries intervening, the gap in time seems too great for any bridge of tradition. The inevitable conclusion is, then, that the dissected figures in the Books of Hours were derived from contemporary anatomical drawings in manuscript.⁴ The following reasons may be given for this inference. In the first place, artists and physicians who followed dissection became associated through the fact that (in Florence at least), the painters formed a subsection of the Guild of Physicians and

¹ Lessing, *Wie die Alten den Tod gebildet: eine Untersuchung*, Berlin, 1769.

² F. Parkes Weber, *Aspects of Death and Correlated Aspects of Life* (etc.), 3d ed., New York, 1918, pp. 27-40.

³ For which, see F. Studniczka: *Die griechische Kunst an Kriegergräbern*, Leipzig, 1915, Plate VIII.

⁴ W. M. de Voynich and F. H. Garrison, *Ann. Med. History*, New York, I (1917-18), 225-30.

Apothecaries (Streeter),¹ whence it is reasonable to assume that the miniature painters of the Books of Hours were also acquainted with dissecting and dissectors. Again, the traditional dissected figures of the Books of Hours are remarkably like those in the anatomical MSS and the earliest printed and illustrated books on anatomy, the so-called graphic incunabula, and, in both, the eviscerated corpses and the skeletal larvae alike have sometimes between their outstretched legs, quaint little jesters, with caps and bells. The inference is plain.

The thirteenth century was the age of cathedrals, stained glass windows, illuminated manuscripts and missals, and beautiful carving in stone. The work of the Romanesque architects and sculptors, deriving, as it did, from Roman, Byzantine, and Arabic traditions, was composite and decorative, but otherwise stiff, conventional, and unreal. The flowering of Gothic art in the thirteenth century was as spontaneous and natural as that of ancient Greece. This art was essentially realistic, in that it sought a direct reproduction of nature, as in the carved flowers and foliage of Reims Cathedral, the carved figures of angels, saints, prophets, Christ, and the Virgin which adorned the cathedrals, the *gisants* or recumbent male and female figures on the tombs of the nobility, or the painted and gilded statuettes and bas-reliefs in wood and ivory. These figures of the Gothic *imagiers*, such as the Amiens Christ (*le beau Dieu d'Amiens*) or the Prophet of Reims, are all serene and beautiful. The pose is gracious and dignified, the skill in representing the contours of the human body underneath thin drapery is wonderful, the grotesques of Romanesque art crop out only in the gargoyles of Gothic cathedrals; but the prejudices of the age forbade alike the figuration of the nude and the study of anatomy by dissection. The science of the *imagiers* was therefore a science of draped figures. This Gothic naturalism exerted a powerful influence upon Italy, in the Apulian school of sculptors and the Florentine school of painters. The pulpit of the baptistery at Pisa, carved by Niccolò Pisano in 1260, reveals the same wonderful skill in the representation of complex drapery, and introduces a new motif, the partly draped Christ upon the cross. Cimabue, the teacher of Giotto, worked in mosaic, after the Byzantine fashion. Giotto followed Niccolò Pisano and the Gothic glass-painters of France, whose brilliant coloring is easily sensed in the paintings of the earlier Italians. As Berenson points out, Giotto was the first great artist to realize the third dimension (depth and solidity) in painting, by giving tactile values to retinal sensations. Just as the infant acquires its knowledge of depth and solidity

¹ E. C. Streeter, *Bull. Johns Hopkins Hosp.*, Baltimore, XXVII (1916), 113-18.

by the sense of touch, so these early Florentines strove to get out of the two-dimensional flatland of the Byzantine mosaics into that great field of figure painting in which the semblance of reality and movement is conveyed by "functional lines," i.e., purposeful lines which are "life-communicating, life-confirming and life-enhancing" (Berenson). Tactile values, that is, the reverse of inexpressive "dead lines" and "dead surfaces," were to be translated into movement, and this realism was attained, in the end, by deliberate science, in particular mathematical and anatomical science. Gradually the Florentines underwent a drill in such disciplines as the chemistry of colors, the mathematics of composition, the geometry of perspective, the illusions of chiaroscuro, the mechanics of motion, and the science of human anatomy. The principles of human proportion were closely studied by them. Practically all the early technical treatises on the science of perspective and the science of bodily proportion, except Dürer's, issued from Florence (Streeter).

In Giotto are found the seeds of these several developments, among other things, the Florentine *flair* for anatomy—a vast abortive inquiry into the physical make-up of man. Once aroused, this interest was never to lapse or fall from the circle of living art, although it was seriously hindered and crossed at various times by the church, as, for example, by Savonarola and again in the period of the Catholic Reaction. It should be noted that it was not Giotto's higher gifts that brought so many into communion with his artistic aims, but his compelling naturalism, his projection of reality into pictorial illusion. Gently with Giotto came the impulse to measure, to explore, to exploit the form, to the end of making more true to nature, more "express and admirable" the pictured world of life in movement. In close and incessant study of human kind, artists searched out all the experiential modes of expressing the inmost soul by the outward gesture, for this was their *métier*. And although the Trecentisti turned away the challenge of fact with rather soft answers, there abode in them at all times, Giotto's love of verisimilitude.

Reorganization of the study of nature, then, was the issue of Giotto's teaching. The spirit of inquiry into nature incited human nature in its deepest essence to push on to the discovery of man. Artists felt that incitement, in a special sense, for the human form was their supreme decorative principle, in the shaping of which they would convey reality and utter fidelity to fact. It dawned upon the minor masters following Giotto, that Nature was the specific for Art's malady, that "things of the mind which have not passed through the senses, are vain things and injurious." But this they knew only in part. They lightly accepted

nature-study as inevitable, avoiding the duteous observances. The outcome of Giottesque schooling, however, was the final abandonment of "intuitional" drawing, the refinement of plastic modeling by shading and defining the separate surface planes and a firmer accentuation of the supporting skeletal system, in each carefully observed figure. Giotto's intimate assistant Stefano (1301?-50), called the "ape of nature," attained to such a pitch of realism in representing the branching veins of the arms, that his pictures were studied by the barber-surgeons about to do bloodletting. Buffalmacco, Daddi, Giotto (son of the "ape of nature"), Orcagna, Giovanni da Milano, Antonio Veneziano, and Ambrogio di Baldese mark distinct stages in the movement toward Renaissance naturalistic forms. Still greater gains in the struggle for the mastery of form are recorded in the sculpture of this early period. Naturalistic treatment of the vital plastic problem, the cause hotly supported by Cennini in theory, and in practice by a majority of the Florentine workers in the serious figurative arts, found ready acceptance in Umbria, Lombardy, the Marches, even inhospitable Siena.¹

A conscious search for form thenceforth characterized art on the Arno. The study of the human figure, objectified and separated from the dross of dogmatic mysteries, held most weighty claims upon artistic genius. Even as envisaged by artists of the trecentist tradition, this study partook somewhat of that intensive quality and independent trend which is the peculiar, yet typical, issue of the union of devouring eye and portraying hand. Now in Italy, eye and hand were rigorously trained for the perfect and final apprehension of form and action, three quarters of a century before the appearance of any printed work on descriptive anatomy or the mechanics of motion which could be of slightest use to an artist. In the interval, the artists, impatient to master external myology, the skeleton, the joints, even "the risings of the nerves," did pioneer work by immediate independent preparations and dissections. These artful prosectors performed so well in the field of external myology, and went so deeply into studies of function of the skeleto-muscular system, that they aroused the ire of the professional anatomists. The fact that artists were herein forestalling the school anatomists, appears on a superficial view, to upset the Pausanian theory of art which literally traces animation, proportion, and detail in painting and sculpture to the progress of geometry, mechanics, arithmetic, and anatomy.

¹ See Giovanni di Paolo's (1403?-82) "John the Baptist," Paul Sachs Coll., Cambridge, Mass. Vechietta's (1412-) "Cristo resorto" bronze, Kann Coll., Paris; and his paintings in the hospital at Siena. See also frescoes of Domenico di Bartolo and the work of Vechietta's follower, Francesco di Giorgio.

In Florence, the circle of true instruction ran on to Antonio Veneziano, who taught Starnina, who in turn taught Masolino. Thus the last of the Giotteschi touched hands with the first Quattrocentisti. Art straightway became more curious and attentive to form, more accommodative and explicit in expression. The unclouded drawing of the nude figure in Masolino's "Baptism of Christ," in the baptistery at Castiglione d'Olena, and Masaccio's epochal frescoes in the Carmine at Florence signalize the return to the Greek conception of form and, at the same time, a return to nature. Leonardo once remarked that Florentine art entered a decline after Giotto, "until Masaccio showed by his perfect works how those who take for their standard anyone but nature—the mistress of all masters—wear themselves in vain." Of Masaccio's frescoes in the Brancacci Chapel, Berenson says: "I never see them without the strongest stimulation of my tactile consciousness. I feel that I could touch every figure, that it would yield a definite resistance to my touch, that I should have to expend thus much effort to displace it, that I could walk around it." With such an ambition as this, with the keen desire to realize depth in space, to convey the illusion of mass underneath the external configuration of the body, with the passion to express the muscular basis of bodily action by surface indications, the Florentines took up dissection, as also the mathematics of perspective and proportion, as a necessary part of their training.

It should be noted here that the painters had early been incorporated in the great "Guild of Physicians and Apothecaries."¹ "Being beholden for their supplies of pigments to the apothecaries and their agents in foreign lands" on their own petition they had become enrolled members of that guild in 1303. This guild relationship endured for more than two and a half centuries, furnishing innumerable points of magnetic contact between Science and Art. The artist members (known from 1349 on, as "The Company of Saint Luke") stood on a most familiar footing with the apothecaries "who buy, sell, and deal in colors and other materials needed by artists" (*spetiarii, qui emunt, vendunt et operant colores et alia ad membrum pictorum memoratum*). Many a "discipulus" from the apothecary shops rose from color-grinding to eminence in the schools of painting. Masolino was not the first of these, nor Cosimo Roselli the last. These dusty backshop prentices who ground colors for the master apothecaries were in daily contact with the medical partners of the shop (*medicos in apotheca*) whose consulting rooms adjoined.

¹ La Sorsa, *L'Arte dei Medici, Speciali e Merciai*. Molfetta, 1907. E. Staley, *Guilds of Florence*. London: Methuen.

The artists, too, who came there perforce for pigments and other materials, found the shops alluring places in which to loiter and renew acquaintance with their fellow-guildsmen, the apothecaries and physicians. Thus through close guild and trade relationships easy intimacies arose between men of the two callings. The physicians were not only the sponsors for the artists in the guild's multiform functions, but their natural patrons, protectors, and collaborators. Hence, when the tide of realism in art rolled over north Italy, adherents of the two branches of the house of St. Luke (painter and beloved physician) could have collaborated, with brilliant effect upon Tuscan art and science. On the whole there was but little concerted action of this kind, and we are put to some trouble to explain the situation on the ground of any fundamental lack of accord. The earlier anatomizing artists, urged on by the grim requirements of formal technique, expected little, and derived little support from physicians in working out their peculiar applications of anatomy to problems of form. Artists concentrated their interests upon the skeletal and muscular systems. Professional school anatomists before Vesalius had failed to elaborate these systems in any detail whatsoever. Even Berengar confesses scant interest in matters of external myology, because of the difficulties in the way of prosection:

Note, reader,¹ that I have made very little comment on the muscles of the body, and that I have concerned myself very sparingly with this system; mainly for the reason that, in the ordinary dissections made before the scholars in the schools, the majority of the muscles cannot be demonstrated. To expose these structures to view properly, extremely long and painstaking labor is required, as well as a suitably appointed room (*ita locus accommodatus*, a place arranged just so).

And yet the smallest mortuary chamber, cubicle, or side chapel in the charnel house sufficed the artist—a cellar or burial pit—it mattered not, when he went down to make essay of the “science of the sepulchre.”

A large share in matters of scientific moment was taken by Paolo Ucello (1397-1475), whose zeal for the house of science had all but eaten him up. He typifies the adventurous temperament of the time. He lacked the largeness of intelligence, the godlike comprehension, the vast variety of attainments of men of the universal stamp like Brunelleschi, Ghiberti, Donatello, Orcagna, Luca della Robbia, and Leon Baptista Alberti. His talent was expended in design, in genre, in geometric development of the laws governing perspective and foreshortening. His passion for literal delineation of the near and present and inquisitive attitude toward exact science, he passed on to scores of unknown industrial craftsmen in Florence, whose unremembered labors enabled later

¹ *Carpi Commentaria . . . super Anatomia Mundini*, Bologna, 1521, p. 516.

painters to proceed from a basis of exact science to the far nobler pursuit of ideal beauty. Men of Ucello's following hewed close to the line; the Carrand Master, the artist of the "Ten Nude Men" in the Stockholm Collection, the creators of those unattributed gems of naturalistic representation now gathered in the Uffizi, the Louvre, London, Berlin, Vienna, Venice, Dresden, and in private hands, flooded the "bottega" of Ucello's day, with a tide, full and flowing, of chalk and wash drawings, pen and silverpoint. These studio sketches and cartoons reveal, to the least prickings of the paper, the full reach of Florentine technique in drawing the living model. They register most patently the crescent interest in anatomy.

Despite earlier hints of the existence of this "*corporum intus curiositas*" among workers in the plastic arts, the followers of Donatello were apparently the first to undertake the study of human anatomy, in the modern sense of a sustained serious discipline for artists. That Donatello (1386-1466) himself assisted at an actual anatomy, at least from the spectator's bench, we need no better proof than his forceful rendering of such a scene in his "Anatomy of the Miser's Heart," one of his Paduan¹ series of bronze tablets illustrating the miracles of St. Anthony. The almost cruel naturalism and searching myologic detail in Donatello's sainted peasants proved a source of torment to lesser craftsmen, leading them along paths of purely objective inquiry to the dissecting room. His pupil Antonio Pollajuolo (1429-98), pupil also of Ucello, was the virtual beginner of artistic anatomy in Italy. "He dissected many bodies to study the anatomy," says Vasari, "and was the first to investigate the actions of the muscles in this manner, that he might afterwards give them their due place and effect in his works." His drawings created a clear space for the new teaching. His engraving of the "Battle of the Ten Nude Men" electrified the town. His painted themes, in which Hercules generally takes the leading rôle, are anatomies of stressed movements, bizarre energy, unimaginably fierce and vengeful power. And the sources of all this sinewy, exuberant phrasing of life spring from immediate and prolonged manipulations of the dead. Pollajuolo had established altogether novel modes of approach to the intimacies of form, and could say with Browning: "The life in me abolished the death in things." This quickening impulse soon made itself felt in all the schools, pagan and pietistic, realistic and conventional, and crossed the Alps northward with Dürer on his return home.

Andrea del Castagno (1396?-1457) "lover of the difficulties of art" (*ammatore delle difficoltà dell' arte*) certainly helped to incorporate the

¹ W. Bode, *Donatello in Padua*, Paris & Leipzig, 1883, Plates X and XI. See also St. Anthony setting a broken leg in the same series.

teaching of Masaccio in respect of figure-draughtsmanship, and may have anatomized to attain that incisive point and apposite modeling which is so striking a characteristic in his work. Although he did not matriculate in the Guild of Physicians and Apothecaries until he was fifty-five, he became a lusty exponent of the new plastic conceptions furnished by proportional analysis and dissection. He is a strict uncompromising realist, bound to his model, in all narrowness, believing that to embellish is to falsify. His interest in character, in ethnic type, is intense. Postmortems by him would surely be expressed in terms of some new declension for he engaged new appetencies for the task, viewing the thing thus from the ethnic angle.

Ucello, Castagno, Baldovinetti, whose great pupil was Verrochio together with Piero della Francesca, whose great pupil was Signorelli, brought in flowing wells of refreshment to Umbro-Florentine art, to join the racing tumult of waters set free by Pollajuolo, or to spread abroad in other directions. The Medici made a special point of encouraging Tuscan artists with scientific leanings. Thus, to impart a fillip to Verrochio's more academic interest in human anatomy, was he commissioned to restore an antique statue of the flayed Marsyas which glorified the gate of the Medici gardens—given the mutilated red-marble torso, by sheer "tour de force" to reconstruct the missing parts. The which he did with consummate skill, utilizing the white veins of stone as the proper superficial veins of the limbs. Verrochio (1435-88) was the first to make practical use of casts of the living body and *écorché* posture models, for use in schools. These marvelous flayed figurines, exhibiting all the superficial muscles in action, accurately moulded in wax, terracotta, plaster, carved from marble or cast in bronze, formed a fresh series of essays in artistic anatomy. Verrochio's bronze *écorchés* certainly were calculated to excite the admiration, emulation and despair of his contemporaries, the same contemporaries who criticized the naturalism of the horse in his great Colleoni statue for its literal translation of the anatomy of the animal as seen dissected. In this sculpture, bronze worker, goldsmith, builder, and painter, the "true-eye," expressed in his very name, meant analytical vision, the firm, poised, robust character of a born teacher. Small wonder that Leonardo lingered on in apprenticeship to this man, for years after his admission to the guild, imbibing sound methods of science along with ideals of drawing, of modeling, of formal composition in line and plane.¹

¹See *Leonardo da Vinci*, Oswald Sirén, Yale University Press, 1916, chap. iii, "An Apprentice in Verrocchio's Studio."

The progress of naturalism was continuous and triumphant; under such champions of reality it was destined to spread far and wide over Italy and finally over Western Europe, in the swift seasons of the diaspora of Florentine science. The new art, grounded on actuality, pleased the princes, and, at the same time, commended itself to the honest and honorable intelligence of the bourgeoisie. In Italy, the people, in wider commonality, had come to share the artist's passion for unadorned truth. There, the verities reigned, through popular choice. "The desire of seeming wise on matters of form, with which every man of us is born" was there recognized as the last treachery of the artistic hand and soul.

The old *Ars et Mysterium* in the canons of painting no longer obtained—at least, there was no longer the mysterious content in the teaching. "Beauty is measured and proportioned by geometrical accuracy." This rule, repeated on all hands, doubtless led to trials of "presumptuous and paltry technical skill" (Ruskin's wrathful characterization of this trend), yet it led straight on to the creation of immortal works, symbols of the highest connotation, most profound experiential expression, attained by man in his glad runs through the amazing universe.

Among those who ran the whole gamut of experience, endowed with the universal mind, mark Piero della Francesca, who became a great master in the exact sciences before he became one in the arts. "He understood all the most important properties of rectilinear bodies better than any other geometrician" (Vasari). He wrote a treatise on perspective, for centuries accredited to a mythical Peter of Bruges. He trained in "*proportioni et proportionalità*," the great Pacioli, companion in studies mathematical of Leonardo da Vinci. His studies of the undraped figure are splendidly realized, effective, and living portraits of the body. His frescoes at Arezzo set him apart as one of the foremost masters of figure expression. His treatment of the resurrection theme at Borgo San Sepolcro proved for all time that "Nature could not invest herself in such shadowing passion of line without some instruction" (to adapt Iago's vivid phrase). On the whole, considering Piero's extant works and his known preoccupation with matters of pure science, the presumption of fact is that he anatomized. He was, in spirit, more scientific, and in his art, more narrowed and bound to nature, than any of the great Florentines with the exception of Leonardo. His Umbrian follower and spiritual heir, Luca Signorelli (1441-1523) exploited the nude in art with astonishing verve and abandon. Luca's severe and sculptural design and modeling, as seen in his "Education of Pan" (*circa* 1475) now

in Berlin, changed, in the following thirty years, by some subtle increase in vehemence of execution, into an utterly different thing, or at least a modally different thing. His frescoes in the cathedral at Orvieto whirl the beholder into regions of Dantesque impressiveness and solemnity. These awful walls are charged with great, primal perfervid presences, executed on a heroic plane; the elder brothers of Michelangelo's Sistine conceptions. Signorelli was a restless experimenter; his handling of vital plastic problems, without diminution of the sense for pictorial illusion, is instinct with a vigor and intensity which is almost satiric, sardonic. Luca even nerved himself to paint the body of his own dead son. That he painted for painters is readily seen.

Of Melozzo da Forlì (1438-94), another pupil of Piero della Francesca, although much could be said, we will mention only his "Pesta-Pepe" or apothecary's assistant braying in a mortar with the muscles of a Hercules—a panel which originally must have served as a druggist's shop-sign. It is done in a vein too dashing to allow of comparison with that piece of neat quick fashioning of the outward form by his master Piero—the "Ercole" from Borgo San Sepolcro, now in Mrs. Gardner's collection—yet the derivation is plain.

Other Umbrians, as Fiorenzo di Lorenzo together with his pupils Perugino and Pintorricchio, never quite succumbed to the spirit of Florentine science, although admitting its prepotency. They drew their St. Sebastians with anatomic refinements which were borrowed, rather than the outcome of individual research. Raphael, too, misprized science while in Urbino and under the influence of these men, yet it is well to remember that his first teacher Timoteo Viti, who had quitted the Bolognese studio of Francia in 1495, in that studio had seen much of the great anatomist Achillini, the life-long friend of Francia. Raphael had a genius for assimilation and in his Florentine period (1504-8) imitated Leonardo and Michelangelo, drinking deep of the Pierian spring. There is much to give color to the rumor current at his death and credited throughout the two centuries following, that Raphael had imitated Leonardo and Michelangelo even to the point of preparing materials for a work on artistic anatomy.

Padua possessed much work of unique merit from the hands of early Florentine masters, and was susceptible to their moulding influence. Giotto (1306), under the eye of exiled Dante, raised the standards of universal beauty in the frescoes of the Arena Chapel; Donatello labored at Padua from 1443 to 1453; Ucello was there also at some time in the same decade, and Fra Filippo Lippi worked there in 1434. Squarcione,

head of the native school in which ancient Roman sculpture and the new Florentine models received equal attention, consciously adhered to the naturalistic mode. He and his scholars lived on terms of some intimacy with the physician Michele Savonarola, in whose brother's house the school was maintained. Squarcione's school took on a tremendous significance through the genius of his chief pupil and adopted son, Andrea Mantegna (1431-1506), the most influential artist in North Italy during the early Renaissance. Mantegna's earnest and intense search for reality is seen in the figures of the Eremitani frescoes. His study of the "Dead Christ" in the Brera Gallery is accepted as the extreme and sovereign instance of realism, the direct inspiration of Tintoretto when he painted his "Finding the Body of St. Mark" (likewise in the Palazzo di Brera) and of Rembrandt's "Deyman Anatomie," in the Rijksmuseum. Next to Mantegna, Cosimo Tura (1430?-95), founder of the school of Ferrara, and Vincenzo Foppa, central master of the Lombard and Brescian region, strove to disseminate most widely the fruits of Paduan discipline.

In studying the early art of Venice, with the view of determining anatomical content and direction, one pauses over Vivarini's long-proportioned figures with exaggerated articulations, and Carlo Crevelli's (1440?-after 1493) scientific interest in tendons and muscular attachments. There is excellent matter in the London and Louvre sketch-books of Jacopo Bellini, and in the work of his sons and their incomparable school-following; in Giorgione (1478-1519) and Titian (1477-1576) whose perennial devotion to the nude was expressed in many a gorgeous Venus, Danae, Europa, Antiope. When Rubens was executing his Prado copy of the "Rape of Europa" he wrote that this Titian to him stood forth as the first picture in the world. To Titian's mind, the St. Sebastian panel of the five-winged altarpiece for the Bishop of Pola, was pre-eminently the best delineation of the figure of which he was capable. The Rhenish follower of Titian, Jan van Calcar from the duchy of Cleves, illustrated the "Fabrica" of Vesalius, fifty-two years after the first anatomical book illustrations for Ketham's "Fasciculus" had been prepared by Mansueti(?), or some member of the school of Gentile Bellini.

The versions of Venus by the mountaineer Palma Vecchio are rugged and healthy (Dresden and Cambridge), contrasted with the more ideal loveliness and greater refinement of Giorgione's (Dresden) and Cariani's (Hampton Court). Giorgione's most important follower was Sebastian del Piombo (*circa* 1485-1547) who became the loyal slave of Michelangelo

in Rome about 1510. Del Piombo far outstripped his fellow-Venetians in zeal for anatomy, yet he was reined in by a certain laziness and disinclination to dissect.

Beyond the Alps also, are multiplied examples in sculpture and painting of accidental modes of anatomic illustration; beginning with Burgundian and Languedoc sculpture, and Flemish and Rhenish painting. The "Adam and Eve" on the Ghent altar by Jan Van Eyck (*circa* 1390-1441); the "Thief on the Cross" at Frankfort, work of the Master of Flemalle (active, 1420-38); "The Descent from the Cross" by Roger Van der Weyden (1400-1464) now in the Escorial; these introduce a long series of masterpieces in the naturalistic Northern manner which found expression later in such works as the "Neptune and Amphitrite" by Jan Gossart (1516) and the purely anatomical pen sketches of Peter Brueghel (1525-69). In Germany, Albrecht Dürer painted the figure according to the strict canons of proportion which he himself laid down. His "Adam and Eve" in the Prado (1507) executed on his return from Italy, easily transcends the efforts of Lucas Cranach and other contemporaries, who repeatedly tried to parallel the performance. The school of Dürer deserves special study from the angle of the cult of science, and because of the very close relations existing between members of that school and the mathematicians and physicians of Nuremberg, Augsburg, and Strassburg. It should be mentioned too, that Cranach, in addition to his active school directorship at Wittenberg, directed a prosperous drugshop there for many years. In Germany, as in Italy, art continually kided the heels of medicine. We may not stop to examine the complex of these relationships, interpenetrating and important as they are. Burgkmair, Shauffelein, and Grien should be studied, with all their kin and kind. The "Hercules and Antaeus" and the "Allegory of Music" by Hans Baldung Grien give the summation of Dürer's mensural method of plotting the unveiled human figure. Perhaps the most acute and telling masterstroke of realism ever set within the limits of a narrow panel is the "Dead Christ" by Hans Holbein, The Younger, painted in 1521, now in the museum at Basel.

To return to Florence, it would seem first and last that the one fixed trysting place for art and science lay in that region round about the Arcispedale Santa Maria Novella, scene of the labors of Domenico Veneziano, Piero della Francesca, Andrea del Castagno, Alessio Baldovini, and Ghirlandaio. In the "Lily Pharmacy," hard by the hospital, was born Cosimo Roselli (1439-1507) sound craftsman, founder of a prolific school which welcomed the teachings of the new anatomy. His

ablest pupils were Piero di Cosimo (1462-1521) and Andrea del Sarto (1486-1531), keen students of anatomy, according to Vasari. A critic might interpolate thus: Vasari in his *Lives of the Painters* is prone to overemphasize these interests, for he was a kinsman of Signorelli and a pupil of Michelangelo. But we can generally check his statements made in this vein, by the direct evidence of drawings and other material remains left by the artist in question; in the case of Piero, the Uffizi drawing of a dead man's head is sufficiently convincing. Andrea del Sarto, in turn, taught artistic anatomy in his own school, beyond cavil of doubt. It was from him that Pontormo learned, and Franciabigio, and Rosso Fiorentino, who furnished the bulk of the illustrations in the anatomy of Charles Estienne (published by Simon de Colines, Paris, 1545).

Men of the central Italian tradition went serenely on, subtly recharging themselves with the primary inspiration of the supreme masters, Leonardo, Michelangelo, and Raphael. This triumvirate had hastened the spread in widest commonality of that dominant idea of Leon Baptista Alberti, namely, that artists should study nature in a truly scientific spirit. What ardors and endurances for science, what trials in the fiery furnace, had these three not passed through—Leonardo in particular! Florentines well remembered how, in the year 1505, the city had gone down in entire submission before Leonardo's divinely drawn cartoon for "The Battle of the Standard" and the competing cartoon by Michelangelo, "The Surprise, by the Pisans, of Florentine Soldiers Bathing in the Arno." "One of these cartoons was placed in the Medici Palace and one in the Pope's Hall; and while they could be seen there, they were the school of all the world" wrote Benvenuto Cellini. So decisive was the display, by these establishers of dissection, that there was no room thenceforth for faulty drawing of the nude figure in action. Many men in Florence, Milan, and Rome knew of Leonardo's favorite project to publish exhaustive researches in human and comparative anatomy—a project crushed under the Tarpeian weight of his materials, amassed in thirty-three years of intermittent dissection and gathered in one hundred and twenty volumes of drawings and descriptive notes. Of his fifty dissections, the first series was performed in the Arcispedale Santa Maria Novella at Florence, next at Milan at the Ospedale Maggiore and Collegio dei Fisici, with Della Torre, and finally (1514-15) at the Santo Spirito at Rome. There his work had been brusquely interrupted by command of the Pope, on complaint of a German, and he accepted the invitation of Francis I to live in France. It was during

his second stay at Milan that he made notation in his MS: "This winter of the year 1510 I hope to complete the whole of this anatomy." But we find him still dissecting four years later in his sixty-second year, in the winter of 1514-15, the winter on whose last December day Andreas Vesalius was brought into the world. Whether Vesalius saw or did not see the work of his great precursor, before the dispersal of these scientific treasures by Melzi's unblest son, remains a vexed question. Granting that Vesalius made use of even some small part of Leonardo's scheme, then may we say that the progress of science is not as faltering and discontinuous as, on the surface, it appears to be at this point in the history of anatomy. The influence of Leonardo upon practical anatomy is decisive; he steps into a place of intolerant central glory.

Less esoteric and secretive in this matter than Leonardo, Michelangelo wielded a tremendously direct influence upon the practice among artists of preparatory anatomies. Upon this question the young giant fell with world-shaking impact, creating a seismic disturbance over the whole field of art. He ruined his health in feverish dissections covering a period of sixteen years. Condivi, his pupil, says of him:

Desiring to learn from nature herself he set her up before him as the true example. There is no animal whose anatomy he did not desire to study, much more, that of man, so that those who have spent all their lives in that science, and who make a profession of it, hardly know so much of it as he.

Condivi's closing comment is more than the mere personal puffery of extravagant admiration; it is true, not only of Michelangelo but of numbers of others in and out of his immediate following. Listen to Vesalius. Having just spoken of an anatomy performed on a Florentine patrician, there comes this peevish outburst:

As for those painters and sculptors who flocked around me at my dissections, I have never allowed myself to get worked up about them to the point of feeling that I was less favored than these men, for all their superior airs.¹

Montorsoli may be regarded as most adept in anatomy, in the group of Michelangelo's fellow-workers. In all probability it was he who executed the figures of the healing Saints Cosimo and Damian, flanking the Medicean tomb. His statues are essays in anatomy. At Genoa, at work on a great statue of the admiral Andrea Doria, we find him consorting with members of the medical guild in the cloisters of Santa Maria della Vigneis, and doing certain dissections there. From Rome, Sebastian del Piombo writes to Michelangelo: "I pray you remember to bring along some studies for me: faces, legs, body or arm, which I have

¹ "Letter on China Root," Basel, 1546, p. 194.

wanted, as you are aware, for so long a time." This appeal illustrates Bode's view:

Michelangelo's overpowering and extraordinary genius began to dominate plastic art before the sculptors had attained to full knowledge of the laws of the anatomy of the human body. Andrea Sansovino, already, in his later works is wholly dependent on Michelangelo, in particular the frescoes of the Sistine Chapel; and this is still more the case with Andrea's pupil, Jacobo Sansovino, and the rest of the Florentine sculptors of that period, scarcely one of whom was able to develop upon his own individual lines.¹

Yet one of the neatest *écorché* figurines in existence, a gem of consummate modeling of a dancing male figure, *excoriato a cuti*, has very recently been attributed to Jacobo Sansovino. It will bear comparison with the crouching *écorché* attributed, with little trace of reason, to Michelangelo. Another admirer of the great man, creator of the "Perseus," Benvenuto Cellini, always insisted in his writings that the essential thing in art was, "thoroughly to understand how to paint the nude." Cellini's diary also throws much light upon the points of contact between artists and physicians, for at Rome he was intimate with Berengario da Carpi (in whom he finds a commendable knowledge of design), and shared his Paris residence for eight years with the Florentine anatomist Guido Guidi (Vidius), one of the teachers of Vesalius, and a son-in-law of Ghirlandaio.

In deliberate rivalry with Michelangelo, strove Baccio Bandinelli, a pupil of Leonardo's friend, the sculptor Rustici. When Sebastian del Piombo painted the huge portrait of Bandinelli,² he put in his hand an expressive symbol of the sculptor's art, a cartoon of two nudes of highly developed musculature done in red wash or chalk. Under Bandinelli and Jacobo Sansovino studied Ammanati, whose ineffectual strivings only served to show all workers in the round how vain was their effort to recapture the Titanic conceptions and execution of Michelangelo. "When for their nudity Bandinelli's 'Adam and Eve' were removed from the high altar in Florence and when the aged Ammanati sent his abject apology to the Academia del Disegno expressing his 'acerbissimo dolore e pentimento' for certain nude figures on Florentine fountains, and the custom of adding zinc drapery loin cloths became widespread—then the reaction against anatomy and the nude may be said to have set in."³

¹ *Florentine Sculptors of the Renaissance*, London, 1910, p. 11.

² Finway Court Coll.

³ Balcarres, *The Evolution of Italian Sculpture*, London, 1909, chap. iv, "Anatomy and the Nude," *et passim*.

There remains the flayed figure of St. Bartholomew by Marco D'Agrate in the cathedral at Milan,¹ marking the summit of misplaced and tasteless brilliance in this direction, inspired by that analogous earlier work by Giovanni Battista da Sesto at the right hand of the portal of the Certosa Pavese. There remain, too, the assiduous labors on anatomic preparations and myologic models, of the two artists Alessandro Allori and Il Cigoli, the latter of whom unhinged his mind from too close application to dissections. As late as 1660 the French sculptor Pierre Puget² (who spent seven years in Genoa) wrote to his patron Louvois, "I am also meditating a group of Apollo flaying Marsyas, in order to represent a kind of anatomy, a thing highly appreciated among sculptors and painters."

To turn again to painting. The Venetian colorists magically indicated the outline of the figure by varying gradations of tone. The figures in Giorgione's "Fête Champêtre" are color surfaces for the play of light. Tintoretto often lost the graphic pattern of the figure entirely, in a welter of chiaroscuro and confusing illumination. These crepuscular mysteries of light fortunately failed to sway other minds in the same degree. Correggio (1494-1534) showed the highest virtuosity in exquisite modeling of the human figure. His "Leda" (Berlin) is outlined in fluid, air-bathed tones; his "Io" (Vienna) and "Danae" (Borghese) reveal extraordinary delicacy in melting gradations of form and color, bathed in sifting light and almost visibly flowing air. These creations (beloved of gods and men) are separated by diameters of the solar system from the parvenu nudes of Lucas Cranach. Following the death of Michelangelo (1564) came the Mannerists, who need not detain us, for they studied nature no longer; they studied instead, the wilfulness and arbitrary choice of form in Michelangelo's later cartoons. From their vapid exhibitions of muscular anatomy misunderstood, pass to the eclectic school of the Carracci, at Bologna, where a sound system of anatomy was taught by charts, models, and dissections, preparatory to drawing from the nude. The sombre Ribera (1588-1656) painted the flayed St. Bartholomew many times with horrible truth and power. Indeed, when his first "Martyrdom of St. Bartholomew" was exhibited to the Neapolitan crowd from the balcony of his father-in-law's house a riot ensued. Ribera handled this congenial theme with dark ferocious competence, easily excelling his masters Ribalta and Agostino Carracci (Sutherland Gallery, "St. Bartholomew"). We have an etching,

¹ See *La Scultura nel Duomo di Milano*, Milan, 1908, p. 193.

² See "Marsyas," *Metrop. Mus., N.Y.*; consult *Mus. Bull.*, Vol. XIV, March, 1919.

from his hand, of the same gruesome theme. Ribera's drawings bear witness to his deep interest in anatomy; he doubtless knew every line of Michelangelo's St. Bartholomew in the "Last Judgment," holding forth his skin in one hand, and grasping the knife, symbol of his martyrdom, in the other. Velasquez (1599-1660), the first to work in oil, painted the nude all too seldom (National Gallery, "Venus and Love") whereas Rubens (1577-1640) seldom missed an opportunity—his female nudes are literally legion, rampant in every collection in Europe.

Like the Laocoön, the sculptures and Sistine frescoes of Michelangelo represent the culmination of a period, the period of physiological and psychological anatomy, which was empirically studied and triumphantly mastered by the Greeks and acquired its scientific foundation in the anatomical drawings of Leonardo da Vinci. All that the plastic and graphic arts could convey of the sensation of reality, the emotional realization of volume, weight, and movement by representation of the violently twisted musculature of the male body and the purposeful deformation of its parts, is rendered in these immortal works, something which no mere static photograph, say of wrestlers in violent conflict, could ever simulate. What is summarized by Michelangelo could only be sensed in a continuous motion picture of such actions, reeled off at slow tempo, for physiological analysis. In Rubens, the rhythmic organization of tactile volumes and the rendering of the sensation of stress and movement conveyed by the modification and deformation of volumes impinging upon one another, reached its highest development. In the long intervening period between Michelangelo and Rodin, between Rubens and Renoir, accurate representation of the nude was confined mainly to the soft, rounded contours of the female body, i.e., to surface anatomy. This preoccupation was due, in part, to the emancipation of art and artists from the early medieval prejudice against the plastic representation of the body *in naturalibus*, so evident in Gothic art, and latterly to the ever-increasing exaltation of the fair sex in the successive periods. "The nude human figure," says Berenson, "is the only object which in perfection conveys to us values of touch and particularly of movement. Hence the painting of the nude is the supreme endeavour of the very greatest artists; and when successfully treated, the most life-communicating and life-enhancing in existence."¹ But the true vehicle for the surface representation of muscular anatomy and its underlying bony structures is the male body. In the female body, which is physically and physiologically an "adiabatic system"

¹ Berenson, *The Central Italian Painters of the Renaissance*, New York, 1897, pp. 77-78.

or storehouse of energy, not specially intended for violent motor activity, the musculature is usually flabby and little developed, except in athletics or strenuous occupations. Artistic representation of its suave contours is usually effected by accounting for the depositions of subcutaneous fat, which set in at puberty and usually go on increasing up to the change of life. Countless variations have been played upon this theme, the recital of which is part of the story of modern painting.

The history of modern painting, one of the greater glories of modern France, is briefly as follows: In the early part of the nineteenth century, a definite and determined reaction against the erotic pictures of Boucher, Fragonard, and Greuze was ushered in by Vien and apotheosized by David. Austere, prudish, insipid themes from Greek and Roman history became the fashion. The classical tradition of the *méthode David* was continued by Ingres, a superlative draughtsman, whose pencil sketches make him, in Hunecker's phrase, "the greatest master of pure line who ever lived." With the advent of Géricault and Delacroix, French art broke away from the stiff formal tradition, with its historical or literary subject-matter. Géricault was almost the only artist in the nineteenth century who dissected, and he dissected even the viscera. With Géricault and Delacroix came two of the fundamental postulates of modern painting, viz., unrestricted freedom in the choice of subjects and the feeling that color rather than line is its true means of expressing form, volume, depth, light, air, and motion. Emancipation from formal or literary subject-matter was largely due to the Spanish artist Goya, who boldly took his themes from the varied life about him, painting almost every conceivable subject, and, in his diabolical etchings, revived the intensely dark backgrounds of Rembrandt and Hals. From Goya stemmed Gustave Courbet, who was reviled all his life for his daring choice of unconventional subjects and who was one of the earliest of the great landscape painters of France. From the Spanish tendency came also the caricaturist Honoré Daumier, whose gloomy backgrounds again suggest Rembrandt and Goya, and whose nude studies of bathing and wrestling scenes introduced a tendency of colossal importance in recent painting, namely, the rendering of mass in motion, of the sensations of tactile volume, contour, weight, and muscular exertion by the sheer and rugged blocking out of dark tones against the light. It is the physiological anatomy of Michelangelo rendered in a new medium. Another product of the Goya tradition was Edouard Manet, who exhausted all the possibilities of unconventional subject-matter ("After Manet, there was nothing new to paint"), who eliminated nonessentials

to the point of elliptical portraiture of the face, but who, with all his feeling for surfaces, never achieved form, depth, and volume in three dimensions. With Manet, came the great landscape painters of the Barbizon School and, inspired by the English Turner, the Impressionists, better termed the Luminists, who sought to represent sunlight, heat, wind, and flowing water by means of color alone. The Impressionist movement culminated in Paul Cézanne, who strove to represent form, subjective solidity, and movement itself by the juxtaposition of planes of color. As Berenson says, Cézanne gave tactile values even to the sky.¹ These new devices were, most of them, utilized in triumphant synthesis in the last paintings of the aged Paul Renoir, defined by Wright as "among the greatest paintings of all time." The summit having been attained, decadence at once set in. Cézanne and Whistler had been influenced by the Japanese. Matisse reverted to the flat two-dimensional art of Persia. Out of African negro sculpture and its angularities came Picasso and the Cubists, who discarded color in favor of block representation in two tones and volume in favor of multilateral vision, or the simultaneous presentation of many aspects of the same object ("Nude Descending a Staircase"). The Futurists, meanwhile, aspired to "empathy" or the identification of the spectator with a series of successive or simultaneous actions supposed to be represented in the picture ("Dynamism of an Auto"). This was the "cosmic tarantella," the chaotic Walt Whitman view of nature, which Berenson derides as the logical opposite of true art, the essence of which, from the time of the Greeks, has been selection. Finally, in the work of the Synchronists, all subject-matter in the shape of recognizable objects was eliminated in favor of experiments in juxtaposition of primary colors, and the sterilizing process was complete. Viewed historically, Cubism and Synchronism are technical experiments toward the purification of painting as the art of conveying sensations of form, volume, and movement by means of color alone.² In sculpture, Falguière followed the traditions of Canova and Houdon; Rodin revived the muscular anatomy of Michelangelo.

The effect of the purifying process upon anatomical representation in painting and sculpture was characteristic.

To a surprising science of anatomy, acquired by dissecting, the great Florentine artists added their own intuitions about the dynamics of

¹ Berenson, *The Central Italian Painters of the Renaissance*, New York, 1897, p. 101.

² This argument has been derived, in the main, from Willard Huntington Wright's *Modern Painting* (New York, 1915), which does for modern French painters what Berenson's volumes do for the Italian painters of the Renaissance.

painting. The success of Giotto, Masaccio, Michelangelo, in conveying the physical sensation of solidity and of violently opposing forces was inherent in their genius, a matter of intuition alone. Their knowledge of anatomy was great, but only Leonardo had any physiological knowledge of the interplay of antagonistic muscles. To purify painting by the scientific study of color, to render the sensations of light, volume, solidity, weight, and movement by the orchestration of color alone, was the ambition of all truly modern painters, from Daumier to Cézanne; and Cézanne, as Wright says, "halted at the gateway of great composition," because, like Gauguin, he took up painting too late in life. Under these conditions, representation of the nude became less a matter of anatomic knowledge and study than of color instrumentation and dynamics. The nudes of Daumier have actual mass, weight, and solidity; like his caricatures they were "great pieces of rugged flesh which had all the appearance of having been chiseled out of a solid medium with a dull tool. . . . The drawing came afterward as a direct result of the tonal volumes." (Wright). Manet's "Dejeuner sur l'Herbe," on the other hand, is only a two-dimensional affair of brilliant surfaces. One of the few modern female nudes in which musculature is apparent, it is none the less as flat as a pancake. In the nudes of Renoir, tangibility, bulging volume, the sensation of mass and weight, as in a living body, are achieved by means of color alone. Cézanne's rough *croquis* of nudes in motion look, many of them, like the drawings of a madman—an artist's experiments in the dynamics of vision. The sketches of Bakst are a wild carnival of *le mouvement* in two dimensions. And all these men had their forebears. Renoir derives from Correggio, Rubens, Boucher, and the rock sculptures in the Indian grottoes; Daumier from Rembrandt and Goya; Rodin from Michelangelo; the block representations of the Cubists from the figurines of the Crô-Magnon artists, from negro sculpture, from Dürer's anthropometric diagrams. The study of the musculature of the back in Courbet's "Femme de Munich" is singularly like certain canvasses of Rubens. The reclining and semi-recumbent figures of Michelangelo, Correggio, Titian, Tintoretto, and other Italians, a pose which for three centuries was a motif in books of anatomic illustration from Berengario da Carpi to Gautier d'Agoty, were repeated by Velasquez and resumed by Boucher, Fragonard, Goya ("Maja nuda"), Courbet, and Renoir. Meanwhile, alongside of the conscious effort to purify painting by making it a matter of color dynamics alone, other tendencies sprang up. Gauguin, Degas, Rops, Toulouse-Lautrec, studied the nude from curious angles, ethnic, social, latterly

pathological, and here Fletcher's dictum that the true content of "artistic anatomy" is physiology and external pathology becomes singularly apposite. Gauguin's studies of Tahitian men and women are genuine contributions to ethnology,¹ like Greek statuary, Holbein's English faces, Lucas Cranach's slant-eyed Wittenberg maidens, Rubens' negro, Raeburn's Scots, Goya's Spaniards, Defregger's Tyrolese, Zorn's Swedes, Alfred Stevens' Belgians, Reinhold Begas' Prussian girls, Sargent's Nilotic woman, Sichel's "Miss Fai," or Zuloaga's "Marcelle Souty." The predilection of Correggio, Andrea della Robbia, Andrea del Sarto, and Rubens for naked bambini has afforded solace to scores of modern German artists, notably in Moritz von Schwindt's cartoons for frescoes in the Royal Palace at Munich. Rodin's "La Belle Heaulmière" reproduces all the horrors of Villon's ballade, and the jaded ugliness of prostitutes has been vulgarized by Rops, Forain, Louis Legrand, and Toulouse-Lautrec. Dürer's "Four Naked Women" and Rembrandt's nudes engendered, in fact, a whole school of modern pictures, in which the female body is seen as deformed and ruined by advancing age, maternity, change of life, grinding toil, vice, or prostitution. Degas, who shut himself up all his life to paint ballet girls, race horses, and milliners, achieved the culmination of this tendency in his pictures of ugly women bathing in tubs. Personally, in his "benevolent malice" and reconciliation to the boredom of life, he was the artistic counterpart of the novelist Huysmans, of the catlike temperament, described by Arthur Symons as "courteous, perfectly polite, almost amiable, but all nerves, ready to shoot out his claws at the least word."

Perhaps it is only a stupid book that someone has mentioned, or a stupid woman; as he speaks, the book looms up before one, becomes almost monstrous in its dullness, a masterpiece and a miracle of imbecility; the unimportant little woman grows into a slow horror before your eyes. It is always the unpleasant aspect of things that he seizes, but the intensity of his revolt from that unpleasantness brings a touch of the sublime into the very expression of his disgust. . . . He speaks with an accent as of pained surprise, an amused look of contempt, so profound, that it becomes almost pity, for human imbecility.

Such have been the tendencies of recent painting of the nude, the apotheosis of the ugly and the disagreeable, running strangely parallel with the substitution of the photograph and the dissected cadaver in place of hand-drawings for the teaching of anatomy. Our thesis,

¹ Fletcher (*Art and Anthropometry*, p. 8) notes the "autotypic instinct . . . the tendency of man in painting or sculpture to reproduce the type of race to which he belongs and the extreme difficulty with which he depicts the type of other races." This subjectivity is nowise true of Gauguin's Polynesians. They are true objective ethnic studies.

however, is to the effect that genuine anatomic illustration arose not in didactic hand-drawings made by physicians, but without didactic intention, in the sculptures and figure paintings of the great Florentines, in immortal beauty comparable only with the statuary of the Greeks and the Gothic *imagiers*.

In the words of Berenson:¹

What brought about this change? In the first place, the Serpent, that restless energy which never allows man to abide long in any Eden, the awakening of the scientific spirit. Then the fact that, by a blessed accident, much, if not most, of this awakened energy was at first turned not to science but to art. The result thereof was Naturalism, which I have defined elsewhere as science using art as the object of its studies and as its vehicle of expression. Now science, devoting itself, as it earnestly did at the beginning of the fifteenth century, to the study of the shapes of things, did not take long to discover that objective reality was not on the side of the art then practiced. And, thanks to the existence at that moment of a man not less endowed with force to react against tradition, than with power to see—a power, I believe, unparalleled before or since—thanks to this one man, Donatello, art in an instant wrenched itself free from its immediate past, threw to the winds its whole medieval stock of images, and turned with ardour and zeal to the reproduction of things as research was discovering them to be. . . .

Created by Donatello and Masaccio, and sanctioned by the Humanists, the new canon of the human figure, the new cast of features, expressing, because the figure arts, properly used, could not express anything else, power, manliness, and stateliness, presented to the ruling classes of that time the type of human being most likely to win the day in the combat of human forces. It needed no more than this to assure the triumph of the new over the old way of seeing and depicting. And as the ideals of effectiveness have not changed since the fifteenth century, the types presented by Renaissance art, despite the ephemeral veerings of mere fashion and sentiment, still embody our choice, and will continue to do so, at least as long as European civilization keeps the essentially Hellenic character it has had ever since the Renaissance.

¹ Berenson, *The Central Italian Painters of the Renaissance*, New York, 1907, 62, 66.

