cal superintendent. During this period the Managing Committee must have had ample opportunity of estimating the fitness of Dr Hutchison to be their servant; and when they did appoint him, therefore, it could not be said that they had done so without knowledge or trial of his capacity. After appointing a medical officer such as Dr Hutchison, they should have reposed every confidence in him; and this should not have been withdrawn till flagrant proofs of his unworthiness appeared. This, we conceive, would have been at once more just to him, and more creditable to themselves, than the ambiguous and hollow friendliness, with which all their covert discontent was veiled. In the most lenient view, it was an indignity to rest the character of any individual fit for the office of medical superintendent on the suspicion and absurd inferences of persons who actually did not know their own minds.

We have, however, dwelt much longer than enough, on a subject by no means agreeable. The changes in the affairs of the Penitentiary have not yet terminated. We have just learnt that Drs Roget and Latham have been *removed* from their office. We cannot conjecture the cause. Mr Pratt has been at length dismissed with a pension of 100*l.* a year—as a reward for all his good deeds; and to close the whole proceedings properly, Mr Anthony White, formerly consulting surgeon, has been appointed medical superintendent with a salary of 300*l.* No compensation or remuneration has been given to Dr Hutchison.

III.

Elémens d'Anatomie Générale, ou Description de tous les Genres d'Organes qui composent le Corps Humain. Par P. A. BECLARD, D'Angers, Professeur d'Anatomie à la Faculté de Médecine de Paris. A Paris, chez Bechet Jeune, Libraire de l'Académie Royale de Médecine, Place de l'Ecole de Médecine, N^o. 4. 1823. 8vo. pp. 728.

AN elementary work on the structure, anatomical characters, and physical properties of the several tissues of the animal body, has long been wanted; and we think that the present is well calculated to supply the deficiency. Bichat's work on General Anatomy applied to physiology and medicine, was beginning to be somewhat behind the state of knowledge and the progress of anatomical research; and its descriptive details of organization were perhaps too much blended with physiological principles and pathological conclusions not always established on the most certain foundation. It was, moreover, too

long and too voluminous for ordinary readers. In a book on the organization of the elementary tissues, simple and untheoretical arrangement, accurate enumeration of physical and physiological properties, description of organization or minute structure, derived from careful and repeated observation, in the most condensed and abridged form possible, are the chief virtues; and the book which possesses these qualities in the greatest degree, will undoubtedly be the most useful and valuable. In this respect the single volume of M. Beclard has unquestionably the advantage of the two bulky tomes of Bichat; and though it is the only work in the field on the same subject, except the first volume of the unfinished *Anatomy of Dr Gordon*, it may be said to be the most deserving of the attention of the student, and by no means likely, for some time at least, to be supplanted by any other competitor.

Our readers will probably remember, that in 1821, M. Beclard published additions to the *General Anatomy of Bichat*, and that we gave rather a minute account of this publication in our 71st Number.* We then alluded very shortly to the circumstances which rendered such a commentary requisite; and we gave such a sketch of the state of knowledge as our limits permitted. We may now remark, that the same reasons which then induced M. Beclard to publish his additions, have operated with greater force in requiring the publication of the present work. It is, by the author's acknowledgment, a mere summary of the anatomical course which he has been in the habit of delivering for a period of ten years; and, though completely independent and perfect in itself, it is the first or introductory part of a general treatise of human anatomy. M. Beclard further acknowledges, that though he has been guided in its preparation by the work of Bichat, he has taken care to add all the most valuable information of subsequent authors; and we find that he has not only availed himself with advantage of the researches of Moreschi, Meckel, and others, but has also improved several of its departments by the correct observations of Dr Gordon. The work, indeed, may be regarded as somewhat like Bichat's system, stripped of its speculative digressions and problematical theories, and reduced into a much narrower compass by a more rigid adherence to mere descriptive details,—but adapted to the increased knowledge and corrected views of the present day, by the addition of every thing valuable, from the researches either of former or recent anatomists. Another characteristic of the present work, not always found in those of France, is the scrupulous justice which is done to the individual researches of foreign anato-

mists,—German, Italian, and English;—and a copious and exact list of references to the writings of those authors who have most distinguished themselves in the investigation of the individual subjects. In this respect, M. Beclard appears to much greater advantage than his predecessor, not only in his more correct acquaintance with the literary history of his science, but in his rigid observance of historical justice to those anatomists, whose claims Bichat has been accused of overlooking.

M. Beclard has commenced his work with an introduction or preliminary dissertation, consisting of two sections; in the first of which he treats of the properties and characters of organized bodies, of animals in general, and their divisions into invertebrated animals, vertebrated animals, and of oviparous and viviparous or mammiferous vertebrated animals; in the second of the human body, of its fluids, of its organs, of organism, of the development and differences of organization, of alterations of organization, of death, and of the lifeless body. In the consideration of the subjects of the first section, the author acknowledges his obligations to the researches of MM. Dumeril, Blainville, Geoffroy St Hilaire, Lamarck, but especially Cuvier; and to all who know how much this eminent anatomist has done in elucidating the philosophy of animal bodies, the avowal that his name must have been quoted in every page, will not appear extraordinary or incredible. In the second part, on the human body in general, Reil, Blumenbach, Ackermann, Mehlis, Plenck, Chaussier, Hebenstreit, Hubner, and Lawrence, are the chief authorities. The views are, in general, correct and elaborate;—to expect them to be original is unreasonable, and, we should almost say, impossible. They are sufficiently minute for the purpose for which they are intended; as correct as they could be in such limited space; and the references will enable those who have leisure and inclination to pursue the subject in the works of individual writers, as far as may be expedient or desirable. We do not pretend to enter into any thing like a minute analysis; as we have often in our periodical labours given such views of this subject as our readers would be inclined to expect from us; and we may refer them to our article on the “Additions” of this author for such observations on the nature and objects of general anatomy as are suited for our pages. It may not, however, be unreasonable to glance very shortly at some of the subjects treated by our author in his Preliminary Dissertation. It is good for our professional readers to be gently drawn from the details of mere practice to the philosophical generalities of the physiological sciences; and an occasional glance at the connection which subsists between organized beings of the most opposite and un-

like characters, will prevent them from converting their anatomical studies into a mere enumeration of bones, muscles, nerves and arteries. We are, therefore, not unwilling to take this opportunity of refreshing their ideas on the various forms of organized life. To these reasons we may add, that it is convenient to exhibit a condensed and abbreviated sketch of the result of the observations and reflections of Cuvier and Lamarck, by one so likely to do them justice as M. Beclard.

Besides the rounded figure which belongs in general to all organized beings, most animals are externally at least symmetrical, and divided by a middle, or vertical line, into two similar halves, and their length in the direction of this line is generally more considerable than the other dimensions. The body contains one internal cavity, which receives the alimentary matters, and which is covered by a membrane or internal skin, continuous with the skin of the outer surface. Many animals have circulating vessels, through which the nutritious matter of the intestinal cavity is conveyed to all parts of the body;—respiratory organs in which this matter is submitted to the action of the atmosphere;—and secretory organs in which a part is separated from the mass. They have genital organs, which generally consist in a cavity from which the germs issue. Lastly, most animals have muscles to perform certain motions, senses to receive the impressions of external objects, and a nervous system consisting of lengthened cords, and round concentrated masses. After adverting to the proportion of the animal solids or organs, and the animal fluids or humours, the author proceeds to give general views of the nature of the general organic phenomena, nutrition and generation, and the particular phenomena of animal life, or those of muscular motion, sensation, and nervous power or action. These animal functions, when they exist, exert a considerable influence over those which are merely organic. In that of nutrition, the introduction and transmission of food is accomplished by muscular organs; in that of circulation, muscles in many animals are found at the origin of the vessels; and, lastly, the application of the atmospheric air to the organ of respiration depends on the action of muscles. Organs of sensation are situate at the entrance of the organs of nutrition; and the acts of generation, like those of nutrition, are modified by the animal functions. These general expressions of a group of facts show, that a definite relation subsists between the several functions, which either exist in the animal body, or distinguish it from other living beings.

To these general characters of animal bodies, the particular ones derived from figure, from organ, and from function, and the distinctions thus suggested, succeed. These we shall take

the liberty of omitting, not because they are uninteresting or uninteresting, but because our readers are perhaps more disposed to study them in the work itself; or in the preliminary dissertations of Cuvier, from which, principally, they are very correctly compiled. We shall, however, lay before them the enumeration of the animal classes and orders adopted by M. Beclard.

After noticing the striking distinction which is established among the classes and orders of the animal kingdom, by the absence or presence of a vertebral column, M. Beclard proceeds to enumerate the animals destitute of vertebræ in the following order.

I. The animals destitute of vertebræ (*ANIMALIA INVERTEBRATA*) contain three great divisions, the Radiated (*Animalia Radiata*), the Jointed (*A. Articulata, Annulosa*), and the Molluscous (*A. Mollusca*.)

A. The Radiated animals constitute a particular class, of which the essential character is,—that the parts are disposed in the manner of rays round a central point. Their structure, which is simple, presents nevertheless varieties, from the *hydræ* or armed polypi to the *asteriæ*. All of them inhabit the water.

1. The polypi, a numerous class, are generally elongated, with a single aperture or mouth provided with radiated appendices; they have an alimentary cavity, digest very rapidly, and absorb by imbibition. Their outer and inner surfaces are similar; in the intermediate substance, which is of a homogeneous and gelatinous form, nothing can be distinguished but microscopic globules. They are so regenerative, that if divided, each part becomes an individual. Light, sound, and other external agents, produce in them impressions followed by motions. Some are fixed to the spot, others are free. The most simple are the *hydræ*, which have an alimentary sac, and multiply by germs or buds. Others, which are united, excrete from their outer surface a hard or calcareous matter called Coral (*polypier*).^{*} Lastly, in some which are compound animals, the common body envelops a secreted substance, the consistence of which varies from that of jelly to stone.

2. Of the *acalephæ* (*ακαληφαί*) or *sea-nettles*, the shape is most distinctly circular or radiated, and the structure varies. The mouth is in the centre, is furnished with *tentacula*, and leads to a stomach which in many is ramified, but which has no other aperture or outlet.

* This term has been introduced into the nomenclature of Natural History by Lamarck, as a general name for the excretions, whatever be their consistence, of that order of animals so long named Zoophytes.—*Histoire Naturelle des Animaux Sansvertèbres*. Tome II. p. 13.

3. The *echinodermata*, or sea-urchins, are radiated animals, asteroid, spheroid, or cylindrical, with more complex organization. An internal cavity, with distinct organs; vascular productions from the intestine ramified through the body; and distinct outlet from the intestine; aqueducts ramified for the purpose of respiration; ovariform masses for the purpose of generation; muscles, and in most of them numerous *tentacula* terminating in suckers, generally termed feet, are the principal characters of this class. The skin is well organized, and often solid; and in some we meet with nervous filaments.

B. In the Articulated or Jointed animals, the body is symmetrical, divided externally into a certain number of rings or segments movable on each other, and formed by skin more or less firm, sometimes hard, except in the intermediate spaces where this covering is soft and flexible. Their muscles are attached inside the skin; their nerves are cords enlarged at intervals, and situated beneath the intestinal canal. Organization of the most varied character is found in this class.

1. Some are vermiform, without head, and articulated feet, and limited to the motion of creeping. These are the *worms proper*, and the *annelides*.

a, In the intestinal worms (*helminthi*), which have some relation to the radiated animals, the body is oblong, cylindrical or flattened, bare, soft; no organ of respiration, or of circulation; and the generation is internal gemmiparous, and sexual, oviparous. They inhabit the bodies of other animals. Their degree of organization varies. In the tape-worms (*cestoides*), which are the simplest, and resemble a long striped ribbon, marked with a longitudinal line, no external organ, nor even suckers, are perceived,—and internally nothing but egg-shaped atoms.

Others (*trematodes et tenioides*), of which the shapes are varied, have merely suckers more or less numerous, ramified in some through the body, which also presents other gemmiferous or ovariferous canals. The *acanthocephali* (*echinorhinci*), have a tube provided with hooks moveable by muscles, two small intestines without outlet, and distinct oviducts, or spermatic receptacles, according to the sex, which is separate. Of the *nematoides*, or cavitary worms, as the ascarides, the organization is still more complex. A mouth, an intestinal canal, with proper outlet, skin provided with muscular fibres, generally marked with cross streaks; distinct genital organs, with marks of separate sex, a dorsal and ventral nervous chord, and two blood-vessels, are the characters of this tribe.

b, In the *annelides* or red-blooded worms, the oblong body is divided into numerous rings, the first of which, forming the

head, is different from the others; and the mouth is either a tube or jaws. An intestine traversing the body; a double system of arteries and veins without distinct hearts, red blood and branchial respiration; hermaphrodite genital organs; muscles, and in many hairy or silky productions (*soies*), which are used for feet; a head with tentacula, and in some black points, which are taken for eyes,—are the chief characters of this class.

2. Of the other articulated animals, all are provided with a head, eyes simple or compound, a mouth, consisting either of lateral jaws or a sucking tube, and complex and varied organs of digestion. Their chest sustains six jointed paws, each joint of which is hollow and contains the muscles which move the next one; their skin is crusted and firm; they have the sense of smell, but its seat is not determined; and their generation is sexual and oviparous. This section consists of three great classes, insects proper, *arachnides*, and the crustaceous animals.

a. The insects proper, or six-footed (*Hexapoda*) animals, must be well known to all. A vestige of heart, in the form of a dorsal vessel, to which no branches have been perceived, contains a white fluid, which appears to be conveyed through the body by imbibition. Respiration is performed by branching *tracheæ*, which meet in two principal trunks. The organs of motion are muscles and skin, hardened by a horny matter contained in its substance, six articulated paws, four wings in most, two in some, in a few none. The organs of sensation are compound eyes, in some smooth, ordinarily to the amount of three, *antennæ*, and feelers. They smell and hear, but the organs of these sensations are unknown. It is well known that these animals copulate once only in the course of their life; that the impregnated female deposits its eggs in a convenient spot; and that the egg produces a worm (*larva*) which changes into a chrysalis, when it assumes the appearance of death, and from this issues the perfect insect. All insects, except the *thysanouræ*, and those which are parasitical, (*Anoplura* of Leach), undergo these changes, to which the general name of *metamorphosis* is given.

b. The *arachnides*, or eight-footed (*Octopoda*) animals, have a head without *antennæ* confounded with the chest, eight legs or paws, and no wings; most of them have feelers; they are subject to *moulting*, or change of skin, but not to metamorphosis. They present two degrees of organization. In the first and most simple, consisting of tracheal arteries, express organs of circulation are not more apparent than in the insects; and those of respiration are branching windpipes distinct from each other. The second, or more complex, consists of pulmonary or branchial arteries, and occurs in spiders, tarantulae, and scorpions. These

animals have a simple muscular heart, dorsal, elongated, cylindrical, branchial or pulmonary, from which vessels proceed to the respiratory organs which are pulmonary sacs, and thence over the whole body. The sexual organs are double in each sex. Some pair several times and live several seasons. The scorpions are ovoviviparous.

c. The millepedes (*Myriapoda*) form a small group of animals intermediate between the insects, which they resemble in structure, and the crustaceous animals, which they resemble in figure. Their body is oblong, consisting of a considerable series of rings, each of which supports one or two pairs of feet. The young ones, on quitting the egg, have six feet and seven or eight rings; the other feet and rings are developed as the animal grows.

d. The organization of the crustaceous animals is more complicated. Respiration is performed by pyramidal *branchiae*, which are lamellar, filamentous, or plumiform, connected generally to the base of part of the feet, sometimes even answering the purpose of these members. Their circulation is double. The blood which has undergone respiration is conveyed to a large ventral aortic vessel, which distributes it through the body; it then is returned to another large vessel which sends it to the *branchiae* or gills. They inhabit the water.

C. The Molluscos form a division of invertebrated animals, in which the form is generally symmetrical but without articulations. They consist of the *Mollusca acephala*, the *M. cirrhopoda*, the *M. gasteropoda*, and the *M. cephalopoda*.

a. The *Mollusca acephala* are of two sorts, either destitute of shell, or provided with a shelly covering.

The *M. Acephala* without shell bear some resemblance to the Radiated animals. Some are united into a common body like the polypi; some are of an asteroid shape, with the mouth at the circumference and the outlet in the centre; some form a cylinder in which the outlets terminate, while the mouths are open entirely; in a fourth sort the intestinal organs are prolonged in a common mass, while the radiated mouth and the outlet mutually approach near the free extremity of the body; a fifth, which continue long united after birth, have the shape of a contractile tube, open at both ends, in the substance of which the internal organs are placed; lastly, a sixth sort, which are fixed to rocks, have the shape of two tubes, one inserted into the other, in the interval of which the water is made to pass. All of these have an alimentary canal with two apertures, *branchiae* or gills, a liver, a heart and ovaries, or internal germs, which produce, without pairing, living individuals; all of them, also, have nervous ganglions and filaments.

b. The *M. cirrhopoda* form a small group of animals intermediate between the molluscous and the jointed animals. The stomach is provided with many minute cells, which seem to do the office of liver; the intestine is single; a dorsal heart; lateral *branchiæ*, a double ovary, or a mass of internal germs, a double serpentine canal for the exit of the young, and a series of nervous ganglions beneath the belly, are their peculiarities of interior structure. These animals are sessile or pediculated, but in all cases fixed.

c. The *M. acephala*, *conchifera*, with a shell, have the body without head, containing all the visceral organs, entirely invested by the hood folded in two, and provided with a calcareous shell, generally bivalve, sometimes multivalve. The mouth provided with lenticular leaflets covered by the hood; the outlet covered in like manner at the other end; four very large bronchial leaflets; the liver voluminous, containing the stomach and part of the intestine; the foot, when it exists, attached between the four *branchiæ*; the heart single, aortic, placed along the back; a principal ganglion situate above the mouth, united by two nervous chords to another opposite; procreation of live young going on without pairing; and, finally, one or two muscles to shut the shell, and an elastic ligament to open it,—are the chief characteristics of this order of molluscous animals.

The *M. brachiopoda*, which have two fleshy arms in place of feet, and appear to have two aortic hearts, are referred to this head. They are not numerous.

d. The *M. gasteropoda* creep on a fleshy disc placed under the belly. The hood which covers its back varies in extent and figure, and produces generally one univalve or multivalve shell. The head placed before, and more or less detached from the hood, has generally two, four, or six *tentacula* above the mouth, which serve for touch, sight, and perhaps smell. Small point-like eyes are ordinarily found either on the head, or on the *tentacula*. The heart is aortic and single. The other organs vary much.

The *M. pteropoda* form a small group between the *acephala* and the *cephala*.

e. The *M. cephalopoda* consist of a small class of the inarticulated or unjointed animals, the organization of which is most complicated. Like the crustaceous animals, they approach in structure the lowest of the vertebrated animals. Their organic characters are as follow. A soft pulpy body enveloped in a sac formed by the hood, which spreads laterally like fins, and through the aperture of which the head appears, with the feet or fleshy arms, with suckers for walking, grasping, and swim-

ming; the mouth between the base of the feet, armed with two strong horny jaws; a gullet like a bird's crop; a second stomach muscular as a gizzard, and a third membranous; a single short intestine, terminating in the aperture of the sac before the neck; a double system of arteries and veins; two branchial ventricles and an aortic ventricle; two branchial organs situate in the sac where the water enters and issues for respiration; a large liver which pours bile, by two canals, into the third stomach, and separate sexual organs. The eye is formed of many membranes, and is covered by transparent skin. The ear is single, a small cavity on each side near the brain, without outlet, and in which is suspended a membranous sac which contains a small stone. The brain is enclosed in a cartilaginous cavity, which is the rudiment of a scull.

Such is the immense series of invertebrated animals. They form three divisions or different types, in each of which there is a general resemblance, and different degrees of complication and perfection of organization. The Radiated are the most simple. Some of them approach to the infusory animals; and the most complicated have no central organ of circulation, and no predominant nervous organ. Destitute of these, they are destitute of organic or vital unity. Next to the Radiated come the Molluscos and the Articulated Animals. Their comparative organic superiority it is difficult to determine; for if on the one side the articulated animals are below the molluscos in respect of the vegetative organs and functions, since many have no real circulation which is found in all the molluscos animals, yet on the other side, the latter are below the articulated animals in development and approximation of nervous masses; and, above all, in instinct, which is so perfect in some articulated animals, that it approaches that of the vertebrated classes.

II. The vertebrated animals (*ANIMALIA VERTEBRATA*) constitute a type or mode of organization to which man and the animals most similar belong. By the organs of the vegetative functions, they approach to the invertebrated animals, but differ widely by those of the animal functions. Their body, symmetrical in shape, always consists of a trunk, and, with few exceptions, members. The trunk is sustained through its whole length by a column consisting of movable pieces termed *vertebrae*; which, though partly solid, form a canal for the central mass of the nervous system. The head, at one end of this column, consists of the skull, in which the brain is placed, and the face, which consists of the jaws, and certain cavities for the organs of proper sensation. The rest of the trunk, with or without certain portions of bony matter, forms one or two

great cavities for containing the organs enclosed in the vegetative or nutritious functions.

In all the vertebrated animals, the intestinal canal, extending from the mouth to the opposite outlet, and presenting sundry enlargements, is provided with secreting glands; viz. the salivary, the pancreas, and the liver. In all are arteries, veins, a heart variously shaped, red blood, and chyloferous and lymphatic vessels. One class only, that of fishes, have gills, (*branchiae*); in the others the breathing organ is a lung. The organ for secreting bile receives the blood returned from the intestines and spleen by the portal vein. All have proper glands for secreting urine, and most have a bladder or receptacle for this excreted fluid. In all, the sexes are distinct; the female has one or two ovaries, from which the *ova* or eggs are detached after fecundation or impregnation by the spermatic fluid of the male. The mode and other phenomena of this process vary in the several classes.

The muscles are numerous, and, except those which form the heart, move the skin, mucous membrane, and organs of sensation, are inserted into bones which they cover and move on each other. Vertebrated animals which have a lung, have also a larynx, though all have not voice. The organs of sensation are two eyes, two ears, two nostrils, the tongue and the skin. But it is chiefly and essentially by the extent and disposition of the nervous system that the vertebrated animals are to be distinguished. We have already alluded to the central mass which consists of a thick cord, or peculiar organic matter, to which the name of *cerebral* or *nervous* has been given, enclosed in the canal formed by the vertebral pieces. To this nervous centre the presence, size, and other properties of which are constant, and distinguish these classes, other portions of definite figure, but various in size and number, are attached. These have been termed, whatever be their variations, brain, and small brain (*cerebellum*.) They are contained in that cavity of the head termed the skull, which they fill accurately in some classes, but imperfectly in others.

The author then proceeds to enumerate certain organs or organic matters, and animal fluids, which belong to particular classes, and under this head adverts briefly to the varying properties of the blood or nutritive fluid, the chyloferous and lymphatic vessels, the bones, and the serous and synovial membranes; remarks the peculiarities of the nervous system, the circulating system, the organs of respiration, motion and generation, in the different classes; and after explaining briefly the modifications of the latter function, under the heads of oviparous, viviparous or mammiferous, and ovoviviparous propagation and parturi-

tion, makes the usual divisions of vertebrated animals, and enumerates the peculiarities of each class.

A. Oviparous vertebrated animals are divided according to their respiration, temperature, atmosphere which they inhabit, kind of movements, cutaneous appendages, &c. into three classes, Fishes, Reptiles, and Birds.

a. Of Fishes, the organization is evidently intended for swimming. They are suspended in a fluid as heavy as themselves; and in many a bladder full of air beneath the vertebral column causes the specific weight of the animal to vary by its compression and dilatation. The shape of the head varies; its structure is complex either in the skull, the lower jaws, or the distribution of the teeth. The number of members varies from total absence to four. The circulation is two-fold; the mass of blood passes through a respiratory organ, but the atmosphere is aerated water. For this purpose, an organ termed *gills* (*branchiæ*), consisting of leaflets attached to lateral rings of the hyoid bone, and composed of many membranous plates, covered with innumerable blood-vessels, is placed at the side of the neck; its orifice is covered with a membrane and an osseous opercle. The water which the fish forces into the mouth, escapes between the divisions of the organ, and acts on the blood. The heart has only one auricle which receives the veins of the system, and one branchial ventricle. The blood having traversed the gills, is conveyed to a large vessel under the vertebral column, from which it is distributed to all parts of the body. The genital organs are peculiar. In the male, an organ termed *roe*, of great size, corresponds to the testicles of other animals, and in the female the milt is a proper ovary. In most the eggs are deposited, to be impregnated by the spermatic fluid of the male; in others, which are generally ovoviviparous, copulation and introduction of seminal fluid take place. The senses are not very perfect; the end of the muzzle contains nostrils; the eye consists of a horny, spherical plate, little aqueous fluid, and a spherical lens; the ear is composed of a vestibular sac, in which stony bones are suspended, and three membranous semicircular canals, generally situate in the cranial cavity; in some there is an oval orifice (*fenestra ovalis*.)

It is only in one genus of this class of vertebrated animals that the deviation from the symmetrical arrangement of organs is found;—in the flat fishes, both eyes are on the same side of the head.

b. The Reptiles present in configuration, structure and functions, greater varieties than any of the three other classes. The circulation is simple, and the respiration partial. In other

words, the heart sends the blood into an artery, one branch of which only goes to the lung; the result of which is, that in each circuit of the blood part only undergoes respiration. The lungs have the form of sacs or large cells, in which respiration may be suspended without stopping circulation. The blood is cold, or not warmer than the atmosphere. They are divided into families or tribes, according to varieties in organization.

1. The Tortoise-family (*Chelonii*). A heart with two auricles, and receiving different blood,—and one ventricle with two communicating cavities, in which both kinds of blood are mixed. They live for months or years without eating, and survive decapitation several weeks.

2. The Lizard-family (*Sauri*) and Crocodiles. Heart as in the tortoise; ribs movable for respiration; the lung extensive.

3. The Serpent-family (*Ophides*). Heart with two auricles; no feet.

4. The Frog-family (*Batrachi*), Toads and Salamanders. Heart with one auricle and one ventricle; lungs. In early life they have gills as fishes, and a similar circulation; the artery is distributed among the gills; the vessels are again united into an aortic trunk for the system at large, and even for the lungs. This is the Tadpole state. When the gills disappear, their arteries are obliterated, except two branches, which unite and form the aorta, and each of which gives a branch to the lung. They are then frogs, toads or salamanders. Some retain the gills, and continue tadpoles during life.

c. Of Birds, the organization is obviously intended for flight; their configuration, proportion of parts, extent of respiratory organs augmenting their specific lightness, and communicating, as is believed, extraordinary muscular vigour, the arrangement of the individual parts of the skeleton, the disposition and proportion of the thoracic and ventral members, its tegumental appendages; and, lastly, the arrangement of the organs of sensation are well adapted to this form of motion through an elastic fluid. The peculiarities of interior structure are too minute for enumeration in this place.

B. The Viviparous, or Mammiferous vertebrated animals, not only differ from the oviparous in mode of generation and degree of respiration, but are distinguished by more perfect animal functions, and intelligence less guided by instinct and more capable of perfection.

The peculiarities of structure recounted by M. Beclard are greatly too numerous to allow us to repeat them, and perhaps the objects themselves are at least generally known to our readers, and therefore scarcely require our minute attention. They

consist chiefly, 1st, In the form and number of certain parts of the skeleton, which are connected with the nervous system or its parts, and with the organs of proper sensation; 2d, In the arrangement and disposition of the organs of circulation and respiration; and, 3d, In the mode of generation, which is essentially viviparous. We are satisfied, that, when we mention these general characters, our readers will find little difficulty in filling up the details, which are readily derived from those objects with which anatomical readers are most familiar. They will find the sketch of our author a useful and convenient guide. The description of the peculiarities of the human subject, which is derived from Blumenbach and Lawrence, is short, but sufficiently distinctive.—

“Intelligence,” says our author, “which constitutes man, is characterized by consciousness, reason, free-will, by the sentiment of moral distinctions, and by that of a divine cause. Man is, of all the mammiferous creatures, that in whom the cerebral and cerebellic hemispheres are most developed, and most marked with convolutions. The volume of these hemispheres is very considerable, compared with the vertebral portion, the nerves, the organs of sensation and the muscles. His cerebral functions are very much developed, and widely differ from instinct. He is endowed with speech, and lives in society. He is the only creature that is truly two-handed and two-footed, and his whole person is constructed for the vertical position. The heart is directed obliquely on the diaphragm, and the disposition of the aorta is different from that of quadrupeds. The organs of digestion are suited to food of various kind, and principally vegetable. The penis is free without interior bone; the womb is a simple oval cavity; the teats, two only, are placed before the breast.”

III. In the second section which now follows, M. Beclard enumerates more minutely the peculiarities of the structure of the human subject; and, after various remarks on the median line, symmetrical configuration, and the division of the human body into separate regions, recognises and adopts the ancient method of dividing its component parts into solids and fluids. This and the chemistry on which it was founded, he thinks, has been too much neglected since the time of Haller and his school; and to do the subject justice, he allots it a more lengthened consideration than under the most favourable circumstances it can require. It is difficult, we think, to say in what light this scholastic, and at the best, useless division of animal substances ought to be viewed. It is certainly one of those happy examples of general proposition, which can never be charged with communicating a great degree of knowledge, or any very novel views. That the animal solids, as they have been named, ought

to be distinguished from the fluids, we readily admit; that the animal fluids are not unimportant, either in a state of health or of sickness, and ought not to be overlooked, we also admit; and that the refined and delicate resources of analytical chemistry have furnished some information on their composition, and may in proper hands furnish a great deal more, we will not deny. But we do not know that a distinction, which is evidently founded on the physico-mathematical hypothesis, which formed at once the boast and the disgrace of the Boerhaavian school, ought to be retained in an age which professes to be guided by observation and experiment. It may indeed be said, that such a distinction cannot in the present day lead to any improper consequences, or bias the sound sense of modern physicians. But if it be even useless or harmless, what reason is there for retaining it, if others equally good can be obtained?

We could have wished that M. Beclard had rejected another of the ancient distinctions; which, if not closely connected with that to which we have now alluded, is at least more gratuitous, and equally useless. In his observations on the organs or animal solids, M. Beclard has laid hold of the notion of a common or elementary fibre; and has indeed admitted that it is extremely vague, and not yet intelligible. This was proper, and pleased us extremely. But he incontinently makes, by a short train of authorities, the inference that such elementary fibre really exists. First, says he, Haller admitted, in the composition of the organs, besides cellular tissue formed by union of fibres and plates, muscular fibre, and medullary substance. Then, says he, this division has been since sufficiently generally admitted, with slight modifications more or less happy. Thus Walther admits a *membranous* or *cellular tissue*, a *fibrous*, or *vascular*, and a *nervous*; Pfaff, a *vascular* or *fascicular*, and a *cellular*; others again, a *cellular*, a *vascular*, and a *massive* or *solid*—without cells and without vessels. M. Chaussier, he reminds us, added to the three component parts of Haller, a fourth, under the name of *albugineous*,—the basis of ligament; and it could not pass through the hands of M. Richerand without being augmented by the *epidermal* or *horny*, which thus forms a fifth. Of the twenty-one tissues admitted by Bichat, continues M. Beclard, he regarded the cellular, vascular and nervous, as generators of the others; and to complete this chapter of hypothesis, M. Meyer of Bonn, in his *Histologie*, admits three elementary organs also;—1st, the cell, the vessel, or the gland; 2d, the irritable, cellular, or muscular fibre; 3d, the sensible fibre, or nerve.

But even with these modifications and changes, the division of Haller does not satisfy M. Beclard. We do not thus reach

the last term of analysis, which it is possible to obtain in anatomy. By the aid of the microscope, these simple organs, and all their modifications, and all their compounds, may be reduced to two anatomical elements;—an animal substance areolar and permeable, and microscopic globules similar to those of the fluids. The first substance alone forms plates, and often fibres, which differ from each other in being longitudinal and filiform in the first case, and spread out or widened in the second. When united, they form cells (*areolae*). This first element, which by itself, under different modifications, constitutes the great part of the organs, when combined with the other, the particles or globules of which it collects and unites, forms the muscular and nervous fibre.

Now, on the whole of this we have merely to remark, that it is of no consequence to the question at issue, what one great speculatist thinks, or what another great speculatist thinks, on a subject on which our knowledge is yet in its infancy. It is not by stating what division Haller attempted of the ultimate elementary fibres, or in what manner his successors modified this division, that we can hope to acquire or communicate just and useful ideas of the organic elements of the human body;—but by examining and treating the animal tissues in various modes, by recording the results with fidelity, and showing what these results indicate. We have ever regarded this division of Haller as the most unfortunate thing for general anatomy that could happen; for, whatever might be the research, judgment, and originality of this eminent physiologist on other subjects, in this he certainly suffered himself to be misled by the hypothetical opinions of the ancient physicians; and the great authority of his name has served as a pretext to perpetuate with subsequent writers, doctrines, the vagueness and fallacy of which they ought to have readily discovered. It was a gratuitous assumption, in the true spirit of mystical science; it was a scholastic proposition formed without sufficient examination of the objects predicated; it was an affirmative conclusion derived from imperfect or inaccurate observation, and without any regard to the rules of analytic induction; yet with all these objectionable qualities, it was announced and repeated by teacher and pupil, with dogmatic infallibility and presumptuous confidence. We can conceive nothing more truly ridiculous than the gravity with which the divinities of medicine delivered their dogmatic aphorisms on the nature and kinds of the *animal solid*, the *simple solid*, and the *living solid*, as if such distinctions were perceived as readily as the colour of the skin, or the shape of the limbs. We trust the anatomists of the 19th century will not testify their admiration of these worthies by begin-

ning at the wrong end of the science, and committing the preposterous error of raising an edifice, ere they have collected materials for its foundation.

It is in truth obvious, that in matters of this description, no positive division ought to be attempted, while our knowledge of the nature of the individual organic substances is so uncertain and so scanty; and every distinction formed in such circumstances is liable to be erroneous, and therefore useless. With regard to the improvement which M. Beclard has himself attempted, after the general opinion above stated, it is surely unnecessary to make any further remark. Though not avowed, we believe it is nearly the same with that announced by D. H. Milne Edwards in his Thesis, on the authority of accurate microscopic observation. These observations are curious, and if confirmed by repetition, certainly merit the belief of anatomists and physiologists. In their present state, it is hardly requisite to say, that they are to be viewed as curiosities to be ascertained, and ought not yet to be admitted into an elementary work, as positive or established matters of fact. We are almost ashamed of saying so much against a scientific matter so trifling and unimportant to many; but it is with some feeling of pain, that we find, after most of our ancient mystical notions of anatomy had been exploded, one of the most chimerical and useless revived by an anatomical writer of some eminence. The present state of anatomical research and of chemical analysis, evidently requires a simple enumeration of all those substances found in the animal body, which can be distinguished from each other by external qualities, physical characters, chemical properties, and more obvious structure—to say nothing of physiological properties, if these are found. An enumeration or arrangement of this kind is much more instructive than any attempt at generalization, however ingenious or elegant. The profound and intimate study of the individual kinds of organic matter, ought to precede every attempt at referring these substances to a few general heads, to which they are unnaturally, if not violently compelled to assimilate themselves.

We proceed to notice very shortly, that M. Beclard, after assigning their respective merits to Pinel in France, Carmichael Smith in England, and Bichat as the imitator of both; and, adverting to the recent improvements of Chaussier, submits an arrangement of the *proximate tissues*, to use the language of chemistry, which he believes equally proper, whether the anatomical, chemical, physiological or pathological characters of the objects be regarded. 1st, The cellular tissue is the principal and general element of organization; it exists in every organic

substance, in every organ, and is the basis of their organization. Modified in consistence, form, or in the proportion of earthy matter contained in it, it forms other kinds of organs. Arranged in the form of shut membranous sacs, it constitutes the serous and synovial system. It forms the tegumental tissue comprehending skin, mucous membrane, the follicles of both, and the generating membranes of the hair, teeth, &c. It is the same, says our author, with the elastic tissue, that recently termed *tawny* or *yellow*, we presume, which is the basis of the vascular system, comprehending artery, vein, lymphatic, approaching however to the muscular tissue. The glandular system, resulting from the union of the tegumental and vascular, pertains to the same order. Another modification, comprehending parts of great tenacity and resistance, is found in ligament or the desmoid tissue. Lastly, M. Beclard refers to the cellular tissue, cartilage and bone. 2d, A second order of organs is formed essentially of muscular fibre; viz. muscles, either connected with bones, or with outer or inner teguments, or with the sensitive organs, or with the heart. 3d, The nerves, and the central masses of the nervous system, constitute a third and last order of organic substances. This arrangement appears to us decidedly objectionable, and founded on most erroneous principles. We cannot, in this place, enter into very minute criticism of its merits; but, with the utmost deference to the author, we submit the following remarks. If we agree with the majority of physiological writers in referring serous and synovial membrane to the cellular or filamentous tissue, with what justice can skin be referred to the same head? On what principle of structure or composition can this be done? Leaving the question of its minute structure, which we regard as still undetermined, it consists essentially of gelatine, a peculiar proximate principle, which is not found, at least to the same extent, either in serous membrane or in cellular substance. Skin is also a substance of much greater tenacity, and infinitely more resisting, than either of the other two substances; and its organization, so far as it has been yet examined, is greatly more perfect. Again, the individual parts of the vascular system, so far as they have been made the subject of attentive research, are by no means like each other, and certainly not like cellular substance. The proper arterial tunic, or the middle arterial coat, as it is often named, is a peculiar organic substance, extremely unlike any other tissue. It is said, on the best authority, that of Berzelius, to contain no fibrine, and to consist chiefly of albuminous matter in a particular condition; but we regard its chemical analysis as still imperfect. Thirdly, The structure and composition of ligament is certainly in every re-

spect different from that of cellular substance. If it contain this last tissue, it is in minute quantity only, and in no proportion compared with the proper ligamentous structure by which it is distinguished. Its chief chemical constituent is a peculiar form of albuminous matter;—gelatine exists in it in very small quantity only. Lastly,—To refer cartilage and bone to cellular substance, is the most useless and uninformative species of generalization we have met with, since we studied the general structure and chemical analysis of bone in the osteology of the first Monro. That learned anatomist, nearly a century ago, described this substance as composed of many *plates*, which were again made up of fibres or strings, the whole firmly joined by *clavicle* or nails; and stated, that, when exposed to strong fire in chemical vessels, they were resolved into *phlegm, spirit, volatile salts, fetid oil*, and a black *caput mortuum*.^{*} Such fanciful notions were more the effect of the imperfect state of knowledge, and especially of chemical knowledge, than of the judgment of the worthy osteographer; and we therefore treat them with that respectful delicacy, to which even the errors of a great mind are entitled. But to hear of an anatomist of the present day referring bone and cartilage to the head of cellular substance, is certainly a novelty for which we were not prepared. We have never regarded it established that bone and cartilage even are allied, or are modifications of the same organic substance; and some few observations, and experiments which we have attempted are in complete variance with such conclusion. But it is certainly the most violent piece of generalization, with which the credulity of the student could be taxed, to consider both as mere modifications of cellular substance.

A chapter, consisting of eight subdivisions, on *Organism*, gives a view of that term similar to those of the German physiologists, from whom it is borrowed. The term may be regarded as an abstract or general denomination to express the idea communicated by the *assemblage and series of actions and processes which take place in living beings, especially animals*. In speaking of the properties of organic substances, he adds to the three varieties of irritable motion, or tonicity, vascular contractility and myotility (muscular motion), that of *vital turgescence*, to which sundry phenomena have been referred by Hebenstreit; and among the varieties of sensation, admits the *coenæsthesis* or general sensation of Reil and Hubner. The former is evi-

* The Anatomy of the Human Bones and Nerves, &c. By Alexander Monro, M.D. pp. 5 & 11.

dently the same with what has been long remarked under the name of erection, in parts, the vascular structure of which is known to be so constructed as to admit of a temporary extraordinary distension. For the phenomena of the second, which have a real existence, it is too obvious that we have long felt the want of a general designation; and it is well that the term of Reil, or any other equally expressive and convenient, be adopted. One thing, however, we must notice particularly. The phenomena of common sensation do not depend on the presence of nervous filaments, as is erroneously imagined by many physiological speculatists; for it can be recognised in many tissues in which no nerves can be shown to exist, and its intensity does not bear any relation or proportion to the abundance or scarcity of the nervous branches. A nerve itself, indeed, does not manifest a greater degree of this property than a ligament or a tendon which has no nerve; and it is as distinct in bone in which nervous branches are scanty, as in muscle in which they are abundant. *Common sensation, in short*, is a property inherent in every animal tissue, and pertaining essentially to its structure.

On the subjects treated in the subsequent divisions of this section,—the development and differences of organization, in which the several divisions of the human race are enumerated and distinguished by their specific characters, from Blumenbach and Lawrence, the alterations of organization, which may be either original imperfections, or the result of disease, and on death and the lifeless body,—we must be content with a general reference to the work itself.

On the details of the subsequent parts of this book it is unnecessary to enter; for it is quite out of our province to attempt, in these pages, an analytical account of an elementary work which the student must study for himself. For the accuracy and correctness of these details we can vouch with great confidence, and have almost nowhere seen any thing like want either of information, of research, or of useful and instructive description. The notices of morbid changes incident to the several tissues, are derived from the most authentic sources, both in the medical history of this country, and in that of the Continent, and are narrated in plain and intelligible language. On the whole, it may with truth be said, that the present volume contains a collection of information on the structure and diseases of the organic tissues, extremely useful to the student, and very convenient to the practitioner.