



with the author's respect
CONTRIBUTIONS

TO THE

NATURAL HISTORY

OF THE

ALLIGATOR.

(CROCODILUS MISSISSIPPIENSIS.)

WITH A

MICROSCOPIC ADDENDUM.

BY BENNET DOWLER, M. D.

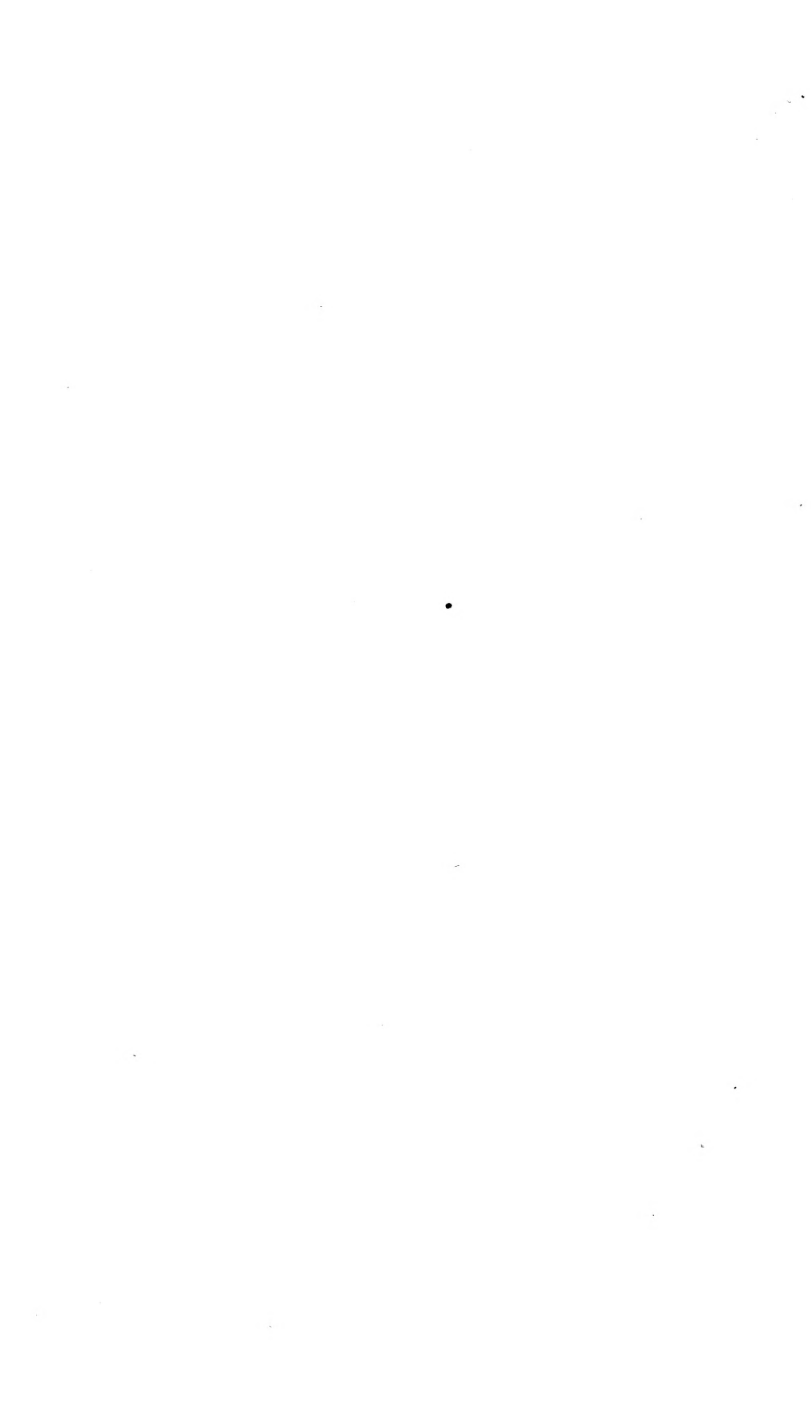
—Ambiguous between sea and land,
The scaly Crocodile—MILTON

[Reprinted from the New Orleans Medical and Surgical Journal, Novbr., 1846.]

NEW ORLEANS:

B. M. NORMAN, PUBLISHER,
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OF THE
A L L I G A T O R,
(C R O C O D I L U S M I S S I S S I P P I E N S I S .)

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— Ambiguous between sea and land.
The scaly Crocodile — *Milton*.

The Fauna of even the most enlightened countries, seems to labor under the same evil which for ages retarded the progress of medicine, namely, an undue bias in favor of artificial classifications and nosological systems. The Crocodilian family affords a strong example of this arbitrary and illusory method of creating orders, genera, subgenera, species, and subspecies, in advance of exact physical data. The integumentary osseous plates, the feet, the claws, the toes, or the teeth, cannot be assumed as the classific criteria, until these shall be examined analytically and synthetically; an achievement which remains for the future, as the sequel will show.

That the Alligator is identical with the Crocodile, can scarcely admit of a doubt. Even those naturalists who have labored most to establish a difference, have admitted directly or indirectly, that there is none of a radical character. As this animal is, nevertheless, modified to some extent by climate, it may be advantageous to adopt names characteristic of the same, or at least, of the locality where this great Saurian is found—as the Nilotic Crocodile, (*crocodilus Niloticus*), the Gangetic, (*c. Gangeticus*), the Mississippi, (*c. Mississippiensis*), and so on. This topographical nomenclature will, for the present, leave the question of scientific classification open, as it ought to be, until vague and contradictory descriptions shall be replaced by exact observations.

The aborigines of America, called the Alligator *Cayman*, the Spaniards, *Lagarto* or lizard; the English, by a corruption of the Spanish, a *Lagarto*; and finally Alligator. The Nilotic Crocodile appears to have

got its name from two Greek words signifying saffron and fear, literally, saffron-fearer. Hence the Egyptians placed saffron near their bee-hives to drive off the Crocodile. "The sovereign power of saffron," says Fuller, "is plainly proved by the antipathy of Crocodiles thereunto."

In this paper it is not intended to give the anatomy, physiology, and habits of the Alligator in systematic detail, but to point out some important facts in its history, freed from the trammels of artificial classification, and to correct certain errors, which, for several thousand years, have been accumulating, until the herpetological account of this saurian has, at length, become as fabulous as that of the Griffin itself.

Men who have but one idea—be that calomel, quinine, or venesection, and who, under the pretence of being practical, reject every other inquiry as "stale, flat and unprofitable," will, no doubt, think that crocodilian investigations are unworthy of their attention. It were easy to show that comparative anatomy, physiology, and pathology, afford an inexhaustible mine of useful knowledge, especially to the practical physician.

Dr. Good, an accomplished scholar and a voluminous medical writer, speaks of "Zoology as something on which we may perpetually dwell with new and glowing delight, and new and growing improvement; a combination of allurements that draw us, and fix us, and fascinate us with a sort of paramount and magical captivity."

The dying moments of Sir Humphrey Davy were devoted to reflections upon the *electrical fishes*, the electricity of which he supposed to be *sui generis*. Being unable, then, to test this experimentally, he enjoined upon his brother, Dr. John Davy, to perform experiments with that view, upon the torpedo, the gymnotus, and the silurus electricus. A correspondent of the *Western Journal of Medicine* for August, 1846, writes from London, that the distinguished Professor Grant is delivering a course of lectures on Zoology in that city, in which he speaks of the habits of the oyster, and the circulation of a lobster, with all the fire of a temperance lecturer.

In modern times, expeditions, at the national expense, have been sent to explore the natural history of different countries—one of the most remarkable of which, was that under Napoleon, in Egypt. That learned and colossal work, *Description de L'Egypte*, was written, as it were, amid the clang of arms. If that was a sublime thought to which Napoleon gave utterance just before the battle of the Pyramids, when, pointing to the summits of those mysterious monuments, he told the army that forty centuries were then looking down upon them:—"Songez que du haut de ces monumens quarante siècles vous contemplent!" how much more sublime was the spectacle within the walls of the Egyptian Institute, where the soldier laid down the sword for the pen, and after a hard fought battle, resumed the profoundest studies on the sciences, arts, and natural history of ancient and modern Egypt. It is remarkable that these mammoth folios, descriptive and pictorial, left an unexplored field in which SAMUEL GEORGE MORTON, M. D., of Philadelphia, has gathered

lasting honors—the field of Skulls—the CRANIA ÆGYPTICA, from which is deduced the ethnographic characters of the primitive races of that country, the caucasian and negro, with their varieties. The invading army under General Taylor, might now accomplish for Mexico,* what the French Expedition did for Egypt, and what the United States Exploring Expedition has done, at the expense of millions of treasure, for the icy continent of eternal sterility in the antarctic ocean, and what the authorities of New York have done, on a scale of surpassing magnificence, in the illustration of the geology, and Fauna of that opulent State. Honor to the citizens who authorised, and to the naturalists who executed, this last mentioned work! The other twenty-eight sisters may look upon it with envy, or rather with generous emulation.

The Fauna of Louisiana is still among the *desiderata*. Our birds have found an able historian in Mr. Audubon, whose work has shed an imperishable lustre on the nineteenth century. A foreign writer, in alluding to the imperceptible insects, exclaims—“there is not a single species that does not of itself deserve a historian!” Ehrenberg devoted ten years to the Infusoria alone. Is such a study dry? Is it not rather the Pierian spring—the true Helicon! If we admit with one author, that man is to be distinguished from brutes by his power of laughing or smiling,† has not the author of the Wandering Jew said, “there are so many kinds of smiles, who can discover the false from the real?”—if with another, that language is the most distinguishing trait—has not Talleyrand said that “language was given to man to *conceal* his thoughts?” Such are not the moral lessons derived from the *inferior*, or, as they are scornfully called, *irrational* animals. Their natural language is as sincere as it is true.

Without entering on questions of orders, genera, and species, I will give, in a desultory manner, descriptions of the Alligator, as taken from five of these animals placed at my disposal, in the months of March and

*It is now nearly half a century, since the learned Humboldt cast a scientific glance over Mexico; and, although much of his account, statistical, social, political, and scientific, is now obsolete, it is, nevertheless, for general reference, the best that can be found. Messrs. Stephens and Norman, have explored some portions of the Mexican territories. As it regards *antiquities* and *ruins*, their discoveries have thrown their cotemporaries in the back ground. Palmyra and the Pyramids, are probably destined to become secondary objects, if we may judge from the presageful glimpses of these researches. Mr. Kendall's interesting sketches of another portion of that Republic, present views of the domestic and social condition of a population, in which little more than the *prestige* of civilization actually exists. The country has been immortalized historically, by the pen of Mr. Prescott. But where is its Flora, its Fauna, its mineralogy, its geology? Mexico, in those respects, needs an exploring expedition more than even Louisiana, for which, neither Royal nor Republican masters, have, as yet, done any thing worth mentioning.

† Milton seems to have adopted this theory:

— “Smiles from reason flow,
To brutes denied.”

April; or rather, I will, for convenience, restrict myself to the two largest of these, as affording fairer results. They were from ten to eleven feet long, and from three to four feet in circumference, in the thickest part of the body. They corresponded with others, some larger and some smaller, which I have casually examined. The two I allude to, were examined several times daily, with much and prolonged attention. They were kept in cages or boxes, the bottoms and a portion of the sides of which were watertight, the residue being lattice work, or rather bars, which admitted wind, rain, and sun. The animals were sometimes kept partly immersed, and sometimes quite dry, during the periods of examination. During many of the observations on temperature of the gullet, and on the digestion of food, the mouth was opened, and was retained so by strong levers, in order to facilitate the experiments, and to prevent the crushing of the arm, &c.

The *upper jaw* is wider than the under, which it overlaps. The latter has forty teeth, none of which are *grinders*, as asserted by Professor Owen—none are cutting or incisor teeth, as they are described to be by Goldsmith. The teeth of the upper jaw are similar in number and structure.

The Cuvierian classification is based on the teeth, which this author says, “are for the Alligator, thirteen on each side of the upper jaw. The fourth tooth, on each side of the under jaw, enters a hole in the upper.”

Professor Edwards, of Paris, in his work on Zoology, (p. 367) characterises the Nilotic Crocodile by its dental organization, but in the very same page, gives these identical characteristics, by which to distinguish the Alligator. Both are recognised by the fourth tooth, one on each side of the lower jaw, as entering sockets in the upper; an excellent example of a distinction without a difference, not unlike Shakspeare’s two lovers :

“Two *distincts*, division none.”

Professor Owen, of London, is quoted in the British and Foreign Medical Review, for January, 1846, as maintaining, in his recent work on Odontography, that “the Crocodile has as many as four generations of *molar teeth*.” Buffon’s account of the teeth agrees with Cuvier’s. Geoffroy St. Hilaire, naturalist to the Egyptian Expedition, enumerates 36 in the upper, and 30 in the lower jaw, all of which, according to his engraving, (pl. 2, *croc. vulg.*) are long and conical. Now, the facts are these: in both jaws there are 80 teeth, nearly half of these, that is 36 or 38, are short blunt teeth, rising but little above the gum, wholly different from grinders—never being worn—occupying the interspaces between the long conical teeth, which latter amount to 42 or 44, and are round, white, polished, tapering, salient, and project from the gum nearly an inch, usually exceeding a quarter of an inch in diameter. As the lower jaw is less expanded than the upper, its long teeth, 20 to 22 in number, are received, not only within the dental range of the upper jaw, but *fit into as many holes in the latter*. Instead, therefore, of two long teeth fitting into two sockets, there are never less than 20 long teeth fitting into as many sockets in the roof of the mouth—an arrangement which totally

prevents the possibility of using grinders, did any really exist. Moreover the teeth of the two jaws are not *opposite each other*. Hence, grinders would be wholly useless. It is evident that these, as well as all the other naturalists whose works I have seen, are wrong in every essential particular relating to the dental apparatus.

Both sets of long, pointed teeth, penetrate plank and wood of all kinds, unless extremely hard. The crushing power of the jaws is *vertical*, not *lateral* or *grinding*. Both jaws present, along their dental or alveolar margins, an undulating or curving line, which, in the Nilotic Crocodile, seems more salient, if I may judge from the engravings of St. Hilaire, and a few others. The teeth correspond to this undulation, as does one jaw to the other. The general bearing of this line is several degrees above the horizon, commencing at the muzzle, and running backward to the posterior angle of the mouth. The form and situation of the dental organs, together with the osteological configuration of the jaws, render *grinding* operations quite impossible. The animals found in the stomachs of Alligators, examples of which will be given, show that their prey is killed by penetrating bayonet-like wounds, and are swallowed without mastication. The crushing and prehensory power of the jaws and teeth, is as remarkable as it is unquestionable.

To classify the crocodilian family by its dental organization, is altogether erroneous, so long as the shape, situation, arrangement and number of the teeth are not as yet ascertained. Scarcely any two authors agree in so simple a matter as the number of the teeth. Goldsmith says there are 27 in the upper and 15 in the lower jaw, and the authors already quoted, all give different aggregates.

As this animal has no *lips*, its teeth, especially in the upper jaw, are naked and salient, even when the mouth is shut, contributing much to its hideous physiognomy, and have probably prejudiced naturalists against its character.

Herodotus, Pliny, Aristotle, and many more modern *savans*, including certain French academicians, assert that the upper jaw moves independently of the head, though both are known to constitute a continuous mass of bone, without any flexible articulation. I have for hours forced the jaws asunder by levers, elevating the upper jaw, and with it the head. The cranium, and the superior maxillary bone, constitute a continuous pyramidal mass of osseous matter, the base of which is the skull, and the apex the muzzle.

Here a digression becomes necessary, the propriety of which can hardly be called in question, by any one who may do me the honor to read the same with attention. My crocodilian researches have led me to attribute most of the errors (so servilely copied for twenty-two centuries), to Herodotus, whom Cicero so justly calls the Father of History. From what this author has said concerning the ears of the Crocodile, I infer that he never saw one of these animals. His account is very brief, and may be found in *Euterpe*, a name which his second book received in a manner so flattering to himself, and so honorable to the discrimination of the Greeks, who, having heard his nine books read at the Olympic games, named them by acclamation after the nine Muses.

In the huge folios of Natural History, produced by the French expe-

dition into Egypt, there is an elaborate history of the Crocodile, and which might be entitled, A DEFENCE OF THE ERRORS OF HERODOTUS; by Geoffroy St. Hilaire, naturalist to the expedition. It is doubtful whether any of the *savans* of the expedition saw or examined a Crocodile in Egypt. Certain it is that they have added nothing original to its natural history. St. Hilaire appears to have picked up all his information at the fisheries, from people more likely to deceive him than otherwise.

This able physiologist, lately numbered with the mighty dead, may have excelled his predecessors in certain branches of natural history, especially that portion so peculiarly his own, relating to *Monstrosity*, or the deviations of nature in the animal kingdom, which he has reduced, in a great degree, to order, regularity and harmony. With all his reverence for Herodotus, he sometimes differs from the old Greek, but never when the latter is wrong, and nearly always when he is right. Herodotus says, the Crocodile is truly amphibious; no, says St. Hilaire, not "*un véritable amphibie.*" And how does the French Herodotus prove this? Answer, ye who import facts, philosophy, and logic from Paris—the modern Athens! The Crocodile is not a true amphibium. Hence, says he, it is in a false position among animals! It is unsuited by nature either to live in the air or in the water! Hence, it is never satisfied, and is always restless; and this, says the great naturalist of the expedition, is the reason why the Crocodile is always ferocious, always cruel! And this is the argument of one of the principal *savans*, whose works, otherwise very learned and valuable, have on the title pages the following words: "*Publié par les ordres de sa Majesté L'Empereur Napoleon, Le Grand.*"

Herodotus satisfied St. Hilaire, and St. Hilaire has satisfied the later naturalists, who continue to copy the blunders of the former and the latter, occasionally adding some on their own account, as will be seen hereafter. These errors have increased, are increasing, and ought to be checked, or rather, consigned to oblivion.

Herodotus declared the Crocodile could move the *upper jaw* only. Pliny copied the statement. "The Crocodile only moveth the upper jaw or mandible, wherewith he biteth hard. (Holland's Pliny b. VIII.) St. Hilaire is much embarrassed with this statement, which he does not fully admit, and which he tries to explain in a very unsatisfactory way.

Herodotus denied a *tongue* to the Crocodile. Pliny says, "the river Nilus nourishes the Crocodile, a venomous creature, as dangerous upon water as upon land. This beast alone, of all that keep the land, hath no use of a tongue—*num hoc animal terrestre lingue usu caret.* (Lib. VIII). Scarcely dissenting from Herodotus, St. Hilaire says that the Crocodile *seems to have no tongue.* The Professor of Natural History to the Royal College of Henry IV, H. Milne Edwards, in his new work *Eléméns de la Zoologie*, says that the tongue is indistinct—"peu distincte!"

The tongue at its tip, including its outer third with its frenum is pale, thin, flabby, wrinkled and adherent underneath, along its whole width, appearing to have but little motion. It is truly tongue-tied. The middle third becomes massive, and begins to assume a roseate hue. The base or inner third is enormously developed, being thick, wide and strong, filling the mouth, and being moveable upward and backward. When

the mouth is forcibly opened, even to the greatest extent, the posterior portion of the tongue is thrown up against the roof of the mouth, just before the palatine arches, so as to act as a valve, completely closing the passage to the pharynx, presenting from one angle of the mouth to the other internally, an even horizontal line. This arrangement must completely exclude water and the like from entering the posterior fauces—a wise provision of nature, because, having no lips, the water must always enter the mouth, when the animal is in its favorite element. It is very seldom that this valve falls, even when the mouth is widely opened for a long period, as an hour or more. This pressure I have often overcome, with a slight force, when passing the thermometer and food into the posterior fauces and gullet. The upper surface or dorsum of the tongue is rough, from large papillary elevations, which are less developed at the tip, but larger or redder towards the base, where, also, the *salivary secretion* begins first to show itself, but the isthmus of the palate, and the posterior fauces only, are well supplied with that fluid. The roof of the mouth is white, dotted over with a few dark spots, rough, firm, almost leather-like, and almost dry, except near the velum or palate, where it is lubricated with mucosity.

Herodotus says, that *insects* (βόελλα, *hirudo*.) or, as translators have it, leeches, by getting into the Crocodile's mouth, suck its blood, and it dies exhausted. In good faith, he naively relates, that the *Trochilus** is the only animal that lives in peace with the Crocodile, into whose mouth it is in the habit of going to pick out these insects—in consideration of this service, the grateful Crocodile never injures the *Trochilus*. St. Hilaire believed, nay proved this story, if we are to credit the Royal Professor of Natural History, in the College of Henry IV, at Paris. He says in his *Zoology* (1837), That the enemies which the Crocodile fears are feeble insects; but, singular thing! little birds go to deliver him from this plague, and entering his mouth without fear, destroy these insects. "*Ce fait, observé par Hérodote et ensuite traité de fable, a été confirmé de nos jours par M. Geoffroy Sainte Hilaire qui accompagna l'Empereur en Egypte. C'est une espèce de pluvier qui rend au Crocodile du Nil ce service intéressé, et aux Antilles le todier a des habitudes analogues !*" (p. 367). A modern sailor, who, returning home, told his mother that in his travels he had seen flying fish, was reproached for telling a falsehood, whereupon he said, that one day in drawing up his anchor in the Red sea, he brought up one of the wheels of Pharaoh's chariot, a statement which his mother admitted without hesitation. *Verbum sat sapienti.*

It is a pity to spoil so good a story—one so honorable to the politeness of the feathered race, and so creditable to the reptilian character. An English Baronet, Sir G. Wilkinson, in his late superb work on *Egypt*, (London, 1843,) avers "*that leeches do not abound in the Nile!*"

That insects should kill Crocodiles may be true. Indeed Dr. Young, of New Orleans, informed me that a young Alligator, which he had kept

* In that magnificent work, "The New York Fauna, Mr. De Kay, gives *Trochilus* as the generic name of the humming bird. Mr. Anthon, in his antiquities says, "The *Trochilus* is the *motacella regulus*, or golden crested wren.

some time, was killed by ants, which, collecting on the top of the head, perforated the skin. It was supplied with water, which it refused to enter.

The soft *Palate* has not, as in the human subject, a central, pendant uvula, but an arching fissure, on each side of which, and nigher the angles of the mouth, is found a structure somewhat similar.

Upon the whole, the tongue is large, excepting only its tip, and, if the Egyptians worshipped the crocodile because it was *tongueless*, they were not wise. "The crocodile was *adored*," says Bishop Warburton, "because having no tongue, it was made in hieroglyphic writing the symbol of the Divinity."

Herodotus says, that the *Eye* of the crocodile is like that of the hog!—a most faulty comparison. The eyes of the Alligator are rather prominent than large, being situated but little below the summit level of the head. The *Pupil* is greatly elongated—scarcely less than an inch vertically, exceeding the horizontal diameter ten or fifteen times—an arrangement, which in connection with the salient position of the eye in a projecting socket, must give it an immense range of vision—probably from the zenith to 45 degrees below the horizon. Contrary to the assertion of Herodotus, it is highly probable that it sees well in water. When it wishes to protect its eyes, a dense, semi-transparent, blueish, nictitating membrane is thrown over the globe. The Cornea comprises all that part of the eye, which is visible under ordinary circumstances. But when the neck is twisted, so as to give pain, a very small crescentic part of the white of the eye, (*tunica albuginea*), is sometimes seen. The eye, so far as I have observed, is constantly open, even during apparent sleep.

The *Iris* is dark, variegated with brown. The cornea occupying the whole front, is exceedingly transparent and lustrous. Excepting the imperfection of the eyelids and the absence of lashes, the eye is well worthy of the attention of the poets, as well as the Gazelle's;—indeed, Dr. Aikin has ventured to write poetry on the crocodile's "*burnished eyes*." As this was all theory with him, and right only by accident, he deserves no credit for it. He had adopted, like many critics, an erroneous opinion, namely, that the *Leviathan*, described in the forty-first chapter of Job, is the crocodile of our era. "His eyes," says Job, are like the eye-lids of the morning."—No one has a right to dispute with Job on natural history. Nor is there any reason so to do. The scales of the animal, he describes, cover *all parts of the body*, "as with a close seal. One is so near another, that no air can come between them. They are joined one to another, they stick together that they cannot be sundered. The sword of him that layeth at him cannot hold: the spear, the dart, &c. He esteemeth iron as straw, and brass as rotten wood. The arrow cannot make him flee; slingstones are turned with him into stubble. Darts are counted as stubble; he laugheth at the shaking of a spear. Canst thou fill his skin with barbed irons?" [see what is said of the skin and osseous, integumentary plates in the sequel.] "He maketh the *deep* to boil like a pot; he maketh the *sea* like a pot of ointment"—a proof that he was not of the crocodilian family, which is only found in lakes, rivers, lagoons and swamps, not in the ocean.

The Edinburgh Encycl., the Encycl. Americana, Scheuchzer in his *Physica Sacra*, Dr. Young of England, and the author of the Bridgewater treatise on Animals, in asserting the identity of these animals, and, that the description of the one "is clearly" the description of the other, have committed a grave error, instead of serving the cause of the faithful, or elucidating the natural history of the book of Job.

Among the many fabulous accounts of this reptile, not the least defamatory and false is that concerning its want of *Sincerity*. It is said to be a hypocrite, and that its tears are false. Hear an old poet :

"As cursed crocodile most cruelly can tole,

With *truthless tears* unto his death, the silly pitying soul."

Fuller declares that "the crocodile's *Tears* are never true, unless forced by the influence of saffron." I have seen the detestable juice of tobacco tried, by a negro, who, spirted his saliva in its eyes, as correctly as Boz could wish, but without producing any tears; it only enraged the animal—an example worthy of the imitation of the great Primate, concerning whose spitting Mr. Dickens has written so well.—An alligator has no deceit. If he hates you, he will hiss you to your face.

This reptile's eye has not, even in the midst of fear, any of that wild, staring appearance, in which the white portion is displayed by both men and animals. Nor is there any of that fiery, injected, rolling appearance expressive of anger and ferocity, which poets and painters dwell upon so frequently.

The *Ear*, if we follow Herodotus, must be a very prominent organ. An Alligator sent to Louis XIV, was examined by the French *savans*, who were quite astounded at not finding the Herodotian ears, though it is doubtful whether they believed their own senses in opposition to so great an authority!—The ear is found with difficulty by the uninitiated. It begins near the posterior angle of the eye, just above the *Suborbital Fissure*—which latter commences anterior to the globe, running below it, in a horizontal, longitudinal direction, diverging backward, corresponding to the expansion of the head, being nearly an inch in depth and in width. The ear is a valve-like slit, fitting so accurately, that probably no water can enter. The animal seems either to have no power, or no inclination to open this valve. It must be opened with a thin edged lever as an oyster. It is about two inches long, the same in depth, presenting a reddish white, flat surface, inclined to the horizon 25° to 35° , corresponding to the plane of the cranium. There is no external auricle or cavity—no external pavilion—no apparatus suited for the reception of pendant ornaments, with which fable has loaded this organ.*—Both the ears and eyes are from three to four inches apart.

The *Nostrils* are very small—less than half an inch in their greatest diameter—oblong, opening about one and a half inches from each other, and the same distance from the tip of the snout, are used in breathing equally with the mouth.

The *Neck* is less than a foot in length, being much larger at its cranial than at its dorsal end. Near the mouth there is an integumentary *Pouch-like* enlargement, which might, perhaps, be called a cheek. But,

*The Rev. Dr. Russel, in his book on Egypt, (Fam. Lib. v. 23d, 1836,) says, that the crocodile's ears are *broad*!

as it is opposite the pharynx, it may be a kind of crop—or reservoir, in which food is temporarily deposited when the animal does not wish to swallow. It will be seen, that I have placed large masses of meat and bone in this region, quite behind the palate, where they remained until withdrawn.

Judging from external appearances, the neck has five *Vertebræ* or articulations. The head, neck and trunk do not equal the caudal extremity in length; the aggregate number of *vertebræ* in the former may be estimated at 25 or 30—that of the latter still higher. The first ten or twelve caudal joints are nearly level for two inches in width, over their superior surface, along the outer margin of which, that is on each side, a serried, acute row of bony processes arise about two inches high. As these recede from the trunk, they converge until they fuse into one perpendicular, central, crested ridge, while at the same time the sides of the tail become more and more compressed, until the whole ends in a thin edge, having a vertical diameter of several inches.

The *Leg* seems wholly disproportioned to the size of the body, and is really very feeble, being easily held, so that the animal cannot withdraw it from the grasp. The foreleg is from twelve to eighteen inches long, and is not as thick as a boy's arm at ten years old. The hind legs are a little larger. There seems to be no great credulity implied in the belief of the story often repeated and pictured, even in scientific works, by which a man is represented in South America as mounting on the back of an alligator and using the two forelegs, which he drew over the back, as a bridle. But as to guiding the animal with this sort of bridle, every one must think for himself.

The *Hands*, feet, or paws bear some resemblance to those of man and of some birds. The forefeet have five fingers, of which the three first or inner, have long bird like claws; the two outer, none. The hind feet have four fingers, the three first or inner of which have strong, curved, tapering claws. There is a slight webbing between the second and third, and a full one between the third and fourth fingers of the forefeet, counting from within. The outer or little finger of the hind legs, joins the next or ring finger, with a web for half its length or one inch. Now whoever will take the trouble to consult authors, will find nothing but confusion and contradiction on this simple matter—even by those who base their classifications on the feet.

In the London Encyclopædia of 1845, there is an incorrect engraving of the Alligator, representing *all the toes completely webbed*. In the new Parisian editions of the works on Natural History, by Lacépède, and by Prof. Edwards, not a vestige of webbing is seen among the toes at all! The Encyclopædia Americana says, *all the fingers or toes have claws!* "Their feet," says Cuvier, "are only semipalmate," None of these accounts are correct.—The *Skin* has numerous, longitudinal, transverse seams, dividing the integument into square figures. Notwithstanding these seams or fissures, which render the skin uneven, it is rather smooth, polished and not very hard, except where the bony plates are found, that is upon the upper part of the trunk.

Omitting the microscopic history of the *Cuticle* for the present, I come to the osseous, integumentary *Plates*—a most prominent feature, and one that has been resorted to for criteria, in giving the distinctive

features of this animal. In an elaborate treatise on Herpetology, in Brewster's Encyclopædia, these plates serve as the basis of scientific classification: "*Crocodilus Mississippiensis*: Muzzle broad and flattened; *four* carinated scales disposed in a square upon the neck." This is the entire description, and is again repeated, and applied to the Alligator.

I will here give an account of one of these plates, taken from the middle of the body. It is of a medium size, much smaller and more regular than those of the neck, though larger than some others which belong to the inferior rows along the sides. It was taken from a skin which had been dried for many years. A maceration of six weeks caused all the soft tissues to separate. The plate proved white and heavy; smooth internally, though apparently marked with the cutaneous fibres—perforated with a few minute holes admitting a bristle only; the general configuration (seen from within), square; each border about two inches long; having rough, suture like margins, from one to three lines thick. The exterior surface is so curiously figured, and withal so irregular as to defy description. The plate rises gradually on three sides; abruptly on the fourth, forming a carinated ridge, being in the central portion nearly one inch high, having about 75 blind holes or depressions sinking from one to three lines into the bone, some of which are large enough to receive half of a small pea; others look like shallow sockets from which teeth have been extracted. On the summit of the carinated ridge are innumerable small holes, not half as large as a hair.—This plate was dried in the sun, and after fourteen months, it weighed 686 grains (Apoth. weight). Its specific gravity was ascertained, most carefully, by Mr. Curtius,* (apothecary,) and myself, and was found to be 2.057.

The skin from which this plate was taken, presented ten larger, with some smaller ones on the neck; the first row on the trunk, nearest the spine, amounted to 16; the second to 15; the third to 11; the fourth to 6. In another alligator, about 11 feet long, I counted on the right side: first row, 17; second 17; third 8; left side, first row 17; second and third rows, irregular in arrangement, situation, size and number. In another, upon which I experimented, the first row gave 15; the second 15; the third 18; the fourth 8. M. Geoffroy St. Hilaire's plate, so far as I can determine, gives for one side: first row, 12; second, third, fourth and fifth, each 16; the sixth, 6; with five larger and some smaller on each side of the neck. (Pl. 2. *Croc. vulg. Hist. Nat.*) Are not the number of plates in some degree proportioned to the age of the animal, as the number of rattles are in the rattle snake (*crocolus horridus*)?

The skin of the alligator, denuded of its cuticle, is white, and, excepting that portion protected by plates, is so penetrable, that I have found no difficulty in dividing it in the living state, and, that too, with the common lancet, the edge of which was not injured or blunted by the opera-

* This young gentleman, (whose knowledge is not restricted to the compounding of drugs, but embraces a large portion of the physical sciences,) adopted a very simple and satisfactory method of expelling the air from this most porous of bones, in order to give its specific gravity with accuracy.

tion. Here, at the least, the maxim, that what every body says, must be true, fails completely. In Brewster's Encyclopædia it is said, that "this animal's hide is generally impenetrable to a leaden musket ball. It is, however, more vulnerable in the belly, and a bullet discharged down the throat or in the eyes, is fatal. The negroes in the river Senegal attack this huge animal either when asleep, or in shallows where its swimming is impeded, and by forcing an oxhide in its mouth, the water flows in, while heavy blows are given on the head to stun it, and it is drowned."

"In Louisiana, the natives contrive to thrust a piece of wood, pointed at both ends, into the throat, or when rushing upon the assailants, its wide mouth is met by a large stake, which is forcibly thrust down, and it is speedily destroyed. Several leaden bullets, even when they penetrate, are sometimes insufficient to kill, unless when they reach the brain, the spine, or some of the large blood vessels. Iron balls are recommended."

St. Hilaire maintains that lead will not kill! So does the Encyclopædia Americana, in which, it is said, that "the body, above and below the *entire length*, is covered with plates"—"impenetrable to a musket ball." Goldsmith's Natural History, (a text book in our schools), is, if possible, still more extravagant in its details: "A negro goes into the water armed with a knife, having his arm bound with a cow's hide; the animal swallows the arm most greedily; a hole is cut in the throat; the water rushes in and drowns it, bloating it as big as a tun." Examples, of a similar kind, might be multiplied, were it necessary. So much for theory, which here, as in many other cases, is stronger than the testimony of the five senses!

Now I will engage to kill an Alligator, not merely with the "bare bodkin" of which Hamlet speaks, but with a common lancet. The animal is easily killed. Dr. Lindsay, formerly a resident in the country, recently informed me, that some years since, while he and his two companions were pursuing a wounded deer, ten miles from Baton Rouge, in Louisiana, the party came on a den or army of Alligators, all of which not only appeared indifferent to their approach, but incapable of being frightened. The gentlemen dismounted, secured their horses, and divided their ammunition, which, though abundant in powder, was restricted in lead to 450 buckshot. It was determined to use only three of the latter for a charge. Each man had, therefore, fifty rounds. Each standing quite near the animals, began the work of destruction; each shot proved fatal. The animals died quickly, in from two to five minutes. They jerked, trembled, turned on one side, and held up one of their quivering hands and died. When the last shot was fired, the survivors lay quietly, unterrified, unconcerned. This spot was often visited afterwards, but no Alligators were ever seen there for years. Dr. L. estimates the number of these animals which he has killed, at different times, at five hundred! Mr. Audubon, the ornithologist, says—that a Louisiana negro will kill a dozen of large Alligators in one evening, cutting off the head with a single blow of the axe, for the purpose of obtaining the oil. (Buffon's Nat. Hist. Am. Edit.) On some occasions he holds a language somewhat dissimilar. He says, "When Alligators are about to go into winter quarters, a child may mount them as a wooden rocking

OSSEOUS PLATE

OF THE ALLIGATOR'S SKIN.

(Natural size—See description, page 15.)

Fig. 1—External view.

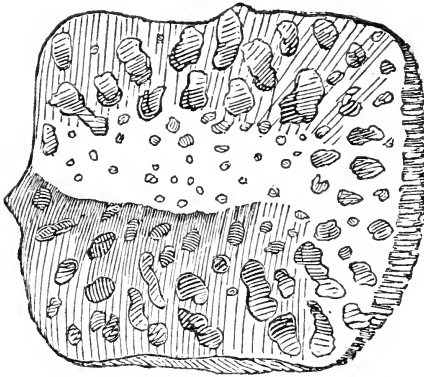


Fig. 2—Profile view.



horse." Several gentlemen have informed me that in digging canals, and in making roads, they have opened the burrows of Alligators, and have been obliged to remove them out of their way: on one occasion, an Alligator had been wounded by a man who was not aware of it at the moment—the animal ran some distance with the man, who had accidentally fallen astride on its back.

I am credibly informed, that when hunters camp out in the forest, the Alligators of the neighboring waters watch for the offal of the camp, during which they are often easily noosed with the lasso, and are then dragged from the water by horses.

The following case, which may be fully relied on, shows that Alligators do not bear herculian doses of physic: Mr. I., an educated gentleman, engaged in the study of medicine, living near Fort Pike, in Louisiana, having observed, in 1845, a recent "Alligator's wallow," and having at the same time killed a snake, he opened its abdomen, into which he inserted about three grains of strychnine, carefully enveloped in several folds of letter paper, which, being properly secured, the snake was left for the Alligator, which, the next day, was found dead, with its abdomen turned up. The snake had disappeared. The Alligator had been poisoned.

Alligators commit errors of diet. The following is a fatal instance: A gentleman of the State of Mississippi informed me, that having been, with others, on a hunting excursion, one of the party finding that the whiskey bottle, which he had been carrying, was now empty, he threw it to an Alligator which was swimming near, in a lagoon. The animal suddenly seized and crushed it. On returning to the same place in a few days after, the animal was found dead, with its abdomen greatly distended and turned upward. A physician being present, it was determined to make a post mortem examination. Broken fragments of the bottle, with putrid fish, were found in the stomach and bowels. These organs were, in many places, quite mortified, and emitted a fœtor, so horrible, that my informant was nauseated, and which, in his opinion, caused the doctor's sickness and death—occurrences which took place soon after the post mortem examination.

I have examined several wounds which Alligators had received during the conflict in which they were captured. The following is a good example of Crocodilian *hyperæmia* or inflammation: A torn and contused wound, of two or three inches in length, between the fingers, was tumefied, but without *redness*. Granulations appeared, coated over with a dense transparent exudation, not flakey, but resembling half coagulated albumen. On touching these, the animal expressed great pain, withdrawing its limb and blowing loudly. Another foot which had been bruised and swollen, without any breach of the skin, presented extensive exfoliations of the cuticle, leaving the true skin *white*. Some recent bruises on the muzzle and in the mouth, together with an incision which I made in the back with the lancet, discharged a little thin, pale, scarlet colored blood. The general hue incidental to inflammation in man, did not occur. It was *white*—analagous types of which do sometimes happen in ordinary practice, as in white swelling, phlegmasia dolens, and in some fatal cases of glottidian and laryngeal hyperæmia, in which the submucous tissue is white, though swelled and infiltrated with lym-

phy, serous, and purulent matter. I have found the epiglottis a mere sack, containing pus, though *blanched*. Hence, the necessity of changing the technology of pathological anatomy. Inflammation is, to some extent, a theoretical word, implying redness and so forth, which may not be essential to its physical history, an evil which may be greatly lessened by using words designating *physical changes only*, as cohesion, softening, brittleness, induration, size, figure, vascularity, injection, collapse, infiltration, and the like. In medicine, words, [prescriptions], are things, which blacken the body with leeches, blanch it with venesections, or modify its organization with the concentrated preparations of medical chemistry.

The Crocodilian *Respiration* is very irregular; I might say, sometimes altogether suspended for indefinite, or at least, very long periods, when the animal is not disturbed. The method I have adopted to prove this, is as perfect as could be desired. For several days, two large Alligators were so placed in their cages, that the water covered the mouth and nostrils completely. They lay perfectly still. There was no movement of the walls of the trunk. The least movement must have agitated the water. Every steamboat or dray that came near, caused slight undulations or waves—the Alligators none, when left unmolested, which, however, seldom happened, as persons frequently came near. On several occasions no interruptions occurred for half an hour, or even an hour. When they are annoyed, and wish to scold or frighten their enemies, they make deep inspirations, inflating their bodies very largely—this air they discharge in low bass notes, or rather with a bellows hissing sound, several times in a minute. There can scarcely be a doubt that one inspiration supplies a stock of air for hours, if not for days. Herodotus was right in considering this animal as a true amphibium, and, of course, St. Hilaire is wrong in denying it, as is Mr. Kirby, in his Bridgewater treatise on Animals, wherein, he asserts, that “the Crocodile cannot remain more than ten minutes under water,” (p. 418). Some illustrative facts might be produced. “Tortoises have lived more than a month with their jaws closely tied, and their nostrils stopped with wax.” (Ed. Ency.) “The hedge-hog, according to Professor Mongili, respire from five to seven times in a minute; but in a room, at 54°, it becomes torpid—respiration is then periodical, being suspended for fifteen minutes at a time, and this, too, in April and May, after it had naturally revived from its winter lethargy.” The same author noticed in the dormouse intervals of suspended respiration for sixteen minutes. By maltreating the Alligator, its inspirations and expirations may be produced at pleasure, but contrary to the chemical doctrine of pulmonary combustion, animal heat is not thereby augmented, as will be shown in the experiments on the temperature of this saurian.

The *Circulation* in this animal, after all my attempts to investigate it, appeared to me, at least, a perfect enigma. On several occasions I explored different regions, wherein I expected to find arterial pulsations, but without much success. This seemed the more surprising, as the axillæ, flanks and limbs were sufficiently soft and flexible, to induce the belief that the pulse might readily be detected. The muscles of the limbs are small, cord-like, and pliable. Either from policy or politeness, the animals allowed the fullest examinations without resistance.

I will give the details of one experiment: April 3d; noon; air, 68°; the axillæ and groins, each 65°: a search for the pulse began, and continued for three hours without intermission or disturbance. The whole attention was directed to this one object. In the first half hour I felt three strokes like those of an artery, in the part corresponding to the wrist. Similar pulsations were noticed in the hind leg, near the foot, amounting, in all, to fifteen in three hours—none were felt in other regions. When a stroke occurred, two or three followed in as many minutes or less. The animals were now irritated. The limb was held in my hand. They puffed and raged, but no increased arterial action was perceived. Is their circulation voluntary, paroxysmal, suspensible? Does the blood flow equably, without arterial impulsion, as in the veins and capillaries? Is not the quantity of red blood, very small in this animal? A wound which I made with the lancet, was barely moistened with blood. Doctor, now Professor Le Conte, of Georgia, in decapitating an Alligator, on which he made some interesting experiments, recently, noticed that “not more than *two ounces* of blood flowed from the wound. (Vide N. York Jour. Med. Nov. 1845).

With respect to certain hybernating animals, “Spallanzani and others are of opinion that the circulation of the blood is entirely stopped in the remote branches of the arteries and veins, and only proceeds in the trunks of the larger vessels and near the heart.”

The *Digestive* function of the Alligator, seems but remotely illustrated by that of man. Herodotus asserts, (with great probability), that during the four winter months, Crocodiles eat nothing—a postulate which St. Hilaire, with all his bias for that historian, denies. From some of the officers, crews, and passengers of a Bremen ship, I learned that two large, healthy, Louisiana Alligators, for two months before going to sea, for two months during the voyage, and for two weeks after its termination, ate nothing whatever. In another case, an Alligator was known to have eaten nothing for forty-nine days. A physician who kept a young Alligator for a considerable period, never could discover that it ate, though food was put in its mouth. Dr. Davy’s experiments on poisonous snakes at Ceylon, show that these animals become more and more active without eating. The tic-pologna (*vipera elegans*) 4½ feet long, which he kept 146 days, took no food. Its poisonous bite killed some animals instantly—others in a few seconds. Spallanzani kept frogs, salamanders and snakes, in a torpid state in an ice house, for three years and a half, and then readily revived them by the atmospheric warmth. Of course they fasted all this time. A turtle which Dr. Davy killed at Malta for experiment, had lived two months without eating, and without any impairment of its activity.

I have several times put into the mouths, posterior fauces and stomachs of Alligators, flesh, bones, and the like, with cords attached; in nearly all cases, I have found these, on the following day, just where I left them, and without any other alteration than that incidental to maceration. In but a single instance did I find that the animal had swallowed any thing left in the mouth or pharynx; though it is difficult to believe that these substances could remain a day or more without causing irritation or strangulation. I tied a cord to a portion of the spine of a hog, with considerable flesh adhering: This was put by force into the mouth. On

returning, in half an hour, I found that the mass had been swallowed. The rope was cut within a foot of the mouth. The next day the rope was pulled—it slipped over the bone, stripping off some of the meat, which, together with the knot of the rope, was coated with a transparent, tasteless, scentless mucosity, without acidity on being tested by litmus. I took a strip of the skin, fat and flesh of a hog, about two feet long, which, being secured in like manner, was put in the mouth; on returning three hours after, I found that the mass was just where I had left it. I then forced it down the throat, leaving the string out as before. Twenty hours after, the whole was drawn up unchanged, except a little blanching, and a coating of mucous matter, as in the last case; though this mucosity slightly reddened litmus.

“Mr. John Hunter conveyed pieces of worms and meat down the throats of lizards, when they were going into their winter quarters, and keeping them afterwards in a cool place—on opening them, at different periods, he always found the substances he had introduced entire, and without any alteration; sometimes they were in the stomach, at other times they had passed into the intestines, and some of the lizards which were allowed to live, voided them towards the spring entire.” A torpedo was kept by Dr. Davy many days; when it died, a fish was found in its stomach much in the same state in which it was swallowed; no part of it had been dissolved: (Researches, v. 1, p. 37).

A curious fact is mentioned by Mr. Audubon, and is directly in point, though shocking to the true disciples of Isaac Walton, namely—that the ornithologist was in the habit of killing Louisiana Alligators, for the purpose of getting fresh fish out of their stomachs. He says, “in those I have killed, and I have killed a great many, when opened to see the contents of the stomach, *or take fresh fish out of them*, I have regularly found round masses of lard substance like petrified wood. These masses appeared to be useful in the process of digestion, like those found in the maws of some species of birds. I have broken some of them with a hammer, and found them brittle and as hard as stones, which they outwardly resemble. And as neither our lakes, nor rivers, in the portion of the country I have found them in, afford even a pebble as large as a common egg, I have not been able to conceive how they are procured by animals if positively they are stones, or by what power wood can become stone in their stomachs.” May not these masses be indurated clay? Are not Alligators, to a certain extent, dirt-eaters? Dr. Lindsay informs me that he has had many opportunities of knowing that these animals defecate large indurated masses, having all the physical properties of the mud banks in which they make burrows or dens.

The *Diet* of Alligators appears to consist chiefly of fish. That they should swallow tigers, oxen, mules and horses, is altogether ridiculous and impossible. How a man of Mr. Audubon’s accuracy, could directly or indirectly give countenance to statements of this kind, appears quite incomprehensible. According to him, “the drovers of Louisiana, when driving horses, cattle and mules, go first into the water and drive off the Alligators, which would otherwise attack the cattle, of *which they are very fond*. They will swim quickly after a *horse*.” (Buffon’s Nat. Hist. Am. Edit.)

Any one who will examine the unyielding osseous boundaries of the palato-pharyngeal, and maxillary regions will find, that their diameters absolutely forbid the idea of this animal swallowing a horse, an ox, or a tiger, any more than a 74 gun ship; though a small calf, a dog, or a pig, is quite a different matter.

The engineer of the Water Works, of New Orleans, formerly resident in the country, was one day, during a visit to a neighboring planter, called upon to witness the manner in which an alligator catches its prey. The planter had just seen it catch one pig; and for his friends amusement, determined to let it catch another. The pig, which was small, continued to root about the alligator's head, until it came nigh enough to be caught. After many efforts, the alligator swallowed the pig. The planter shot the alligator immediately, and directed his negroes to open it, with large knives. The two pigs were found quite dead—not masticated, but marked by penetrating wounds, from the teeth—an eel, quite natural in appearance, and about a peck of cotton seed were also found in the stomach.

Many authors assert, that alligators cannot *swallow* under water. In offering some facts to disprove this assumption, the sagacity of these animals will be more or less illustrated. A gentleman, on two occasions, watched alligators when catching sunfish, which were swimming in shoals, in shallow water. The alligator placed his long body at a suitable distance from the shore. As soon as the fish came between him and the land, he curved his body, so that they could not pass; the tail was moored on land; the mouth was opened under water, and brought so close to the shore, that the fish had no method of escaping, but through the mouth, where they were entrapped. *Incidit in Scyllam, qui vult vitare Charybdim.*

Dr. Lindsay has often observed, in midsummer, when the inundation is subsiding, and swamps, lakes, lagoons, and bayous, are becoming dry or too shoal, for not only alligators, but the fish, that a general migration commences. When thousands of square miles, submerged for several months of the year, are about to become desiccated, these knowing animals begin to travel. When the water subsides rapidly, there are currents through narrow channels, from the higher to the lower basins and streams, to which the alligators repair, in great numbers, and turn their heads up stream. The large buffalo, and still larger cat-fish,* with many other fishes of the lower Mississippi, in their migrations,† through these straits, are thus devoured; often, very few escape.

* Family *siluride*; genus *pimelodus*. Some of these silurians, attain a colossal size, in Louisiana.

† "The action of beasts," says a French writer, (M. Bayle,) "are among the profoundest mysteries upon which human reason can dwell; and, that so few people should perceive this, is to me a matter of surprize." Yet, like the great Primate, they sometimes commit mistakes; even in late years, alligators have come into New Orleans—an *error loci*—fatal to the wanderer, as he never returns again to his reedy, plashy den. Poets and philosophers tell us, that man is governed by *reason*, but when they speak of brutes, they ascribe all their actions to *instinct*. I will not stop to examine what is gained by using that convenient word; but will simply say, that *inspiration* or *Divine affliction* would seem much better to accord with their descriptions and explanations as usually

All these enormous fish are *swallowed under water*—the power of doing which, Cuvier expressly denies them. He says, “that they first drown their prey; then they carry it to some submerged crevice, to putrify before they eat it.” Hence, the Cuvierians hold, that alligators live on rotten flesh. The truth is, these animals live mostly on fresh fish—a fact asserted by Sir G. Wilkinson, with respect to the Nilotic crocodile.—(V. 2d p. 124, London, 1843.)

The learned and the unlearned, seemed never tired of telling about crocodilian *ferocity*—Cuvier, among the rest. Professor Edwards, in his new work on Zoology, says “this animal is very ferocious and dangerous, even to man.” So says the new London Encyclopædia, which gives a very dramatic story about an alligator, that invaded a South American city, and in the presence of the governor, carried off, in his capacious jaws, a living man! Mrs. Trollope’s story, which follows, has become classical, and is quoted as authority. The scene is laid in Louisiana, the hero is a squatter. The poet is a lady: “towards day-break, the husband and father was awakened by a faint cry, and looking up, beheld relics of three of his children scattered over the floor, and an enormous crocodile, with several young ones around her, occupied in devouring the remnants of their horrid meal. He looked around for a weapon, but finding none, and aware that he could do nothing, he raised himself gently on his bed, and contrived to crawl from thence through a window, hoping that his wife, whom he left sleeping, might with the remaining children, rest undiscovered till his return. He flew to the nearest neighbor, and besought his aid; in less than half an hour, two men returned with him, all three armed; but, alas! they were too late! the wife and her two babes lay mangled on their bloody bed.” (Six killed.) Captain Alexander, a voluminous writer of travels, who visited Louisiana, in 1831, says, the people “are obliged to keep a sharp look out lest their children should be snapped up by alligators.” In Lacépède’s Natural History, just from the French press, an engraving is given, representing an alligator as swallowing a negro! This work, quotes M. de la Coudrenière’s account of the Louisiana crocodile, (*Journal de Physique*, 1782), in which he sets forth, that this animal *feeds on men, particularly negroes*—“*particulièrement les nègres*”—and that it roars as loud as a bull! Other writers say, that this animal prefers negroes to all other kinds of diet. If this be true, the fondness is mutual. A gentleman of New Orleans, once a planter, assures me, that his slaves were in the habit of eating alligators, which, invariably made them sick. All his authority was insufficient to prevent this practice. The sickness was so frequent and so peculiar, that he could readily recognize it without difficulty. He gave emetics for its cure. The suspected substance was always brought up; though the negroes always denied having eaten the

given—none of which is, perhaps better, poetically or philosophically speaking, than that of Pope, on the migration of birds:

“Who bade the stork, Columbus-like explore
Heavens not his own, and worlds unknown before?
Who calls the council, states the certain day,
Who forms the phalanx, and who points the way?”

For practical purposes, the syllogisms of Aristotle are often not so satisfactory as instinct, nor so logical, nor so certain.

same. This fondness extends to dogs, which are often fed with the tail of this animal, which is the choicest part. A physician, who once tasted this animal's flesh, informed me that its flavour, in some degree, resembled that of fish, though unpalatable.

Goldsmith says, that the crocodile "*unpeoples countries, making navigable rivers desert and dangerous.*" Let that suffice for the moderns. Rollin and others spend much learning to show, that the Egyptians worshipped this animal, because it defended their nation from all their enemies, particularly the Arabs. Let this suffice for the ancients.* Truth requires me to say, that there are several examples on record, showing that alligators have bitten persons, while the latter were wading or swimming in the water. Mungo Park, in his second expedition to explore the Niger, says, "that his guide, in crossing a river, was seized by the thigh by an alligator, and dragged under the water. The man put his fingers into the eyes of the animal, which caused him to let go his hold; but soon afterwards he seized him by the other thigh, and the guide took the same method to save himself, and succeeded, having suffered two bad wounds." (v. 2, p. 130.) In 1835, the Jacksonville Courier, (newspaper) in Florida, details the case of a young man named Norton, who was bitten by an alligator in the hand and arm, one of the bones of which was broken. The man *gouged*† the animal, causing it to let go its hold. It was killed, and measured ten feet in length.

Admitting these statements as altogether true, it may be truly said, that there is scarcely an animal, wild or domestic, which has committed so few injuries upon man—a position worth illustrating, as even twenty-two centuries cannot make a falsehood, true. Besides, it is right to give the alligator, as well as the devil, his due.

As illustrative of the *pacific* and friendly character of the alligator, I make the following quotation from the Missionaries' letters, reviewed in the London Quarterly, volume the eleventh. At the Nicobar islands, in the Bay of Bengal, these animals are numerous. "Mr. Hænsel was walking along the coast of Queba, looking on a number of children who were sporting in the water, when he saw a large crocodile proceeding towards them, from a creek. He screamed, and made signs to some Chinamen, to go to their assistance. The Chinamen laughed at his

* It seems, that both ancient and modern historians have had a *carte blanche*, to say what they pleased about crocodiles and the Egyptians. Rollin and others say, that the latter worshipped the ichneumon, because it killed the crocodile: "it leaped into his mouth, ran down into his entrails, cut out a passage, and returned victorious over so terrible an enemy!" and yet, the same authors pretend, that the crocodile was worshipped because it defended the Egyptian nation. If the ancients had some faults, they were not wholly destitute of common sense. Why should they worship the ichneumon, because it killed the defender of their country?

† "GOUGE.—A joiner's tool. The word is used by the North Americans, who in their savage quarrels, not unfrequently *gouge* out eyes."—*Richardson's Dictionary*. Now this definition is, no doubt, intended to have a damaging effect on Americans; it is, besides, an Americanism; and a writer in the National Intelligencer says, that *American* writers, dread nothing so much as an Americanism. This word is not only necessary, but excellent, though the practice it designates, is bad, except in the case of crocodilian fights.

fears, and presently he saw the crocodile playing among the children, while they diverted themselves by pretending to drive him away."

Sir G. Wilkinson, in his late work on Egypt, says, "the Nilotic crocodile is, in fact, a timid animal, flying on the approach of man; and generally speaking, only venturing to attack its prey on a sudden."—(V. 2, p. 124.)

Audubon, while traversing Louisiana, in pursuit of birds, became much acquainted with the habits of the alligator. He says, that these animals were so numerous on Red River, before the introduction of steamboats, that hundreds might be seen at once—the smaller riding on the backs of the larger, groaning and bellowing like thousands of mad bulls, about to meet in fight; all *so careless of man*, unless *shot at or positively disturbed*, that they remained motionless, suffering boats or canoes to pass within a few yards of them, without noticing them in the least. Thousands of the largest were killed, while the mania of having shoes, boots, or saddle seats made of their hides lasted. Many of the squatters and strolling Indians followed, for a time, no other business. The discovery that their skins are not sufficiently firm and close grained, to prevent water or dampness long, put a stop to their general destruction.

When alligators, (continues this gentleman,) are distant from water, and perceive an enemy, they drop and lie flat, with the nose on the ground, watching the intruder's movements. Should a man then approach them, they do not attempt to make away or attack, but merely raise their body for an instant, swelling themselves, and issuing a dull blowing, like a blacksmith's bellows. *Not the least danger need be apprehended.* You kill them with ease, or leave them. The chief means of his attack or defence is his large tail. Woe to him who goes within its reach. Mr. Audubon often waded through lakes and lagoons, with no defence but a stick, to drive the alligators out of his way. If, says he, you go towards the *head* of an alligator, there is *no danger*; and you may safely strike it with a club four feet long, until you drive it away, merely watching the tail, which, at each blow, throws to the right and left most furiously. In company with a friend, he killed an alligator of extraordinary size, which appeared to be centuries old, many of the teeth of which measured three inches, and which served for powder chargers. The body was seventeen feet long.

I have been credibly informed, by actual observers, that on meeting an alligator in narrow paths, among canebrakes, briars, and other thickets, there is no method by which the animal can be induced to retreat or turn aside. The traveller must either kill him or turn back himself.

Dr. Lindsay, of this city, related to me the following occurrence: A vast number of alligators being congregated in a confined situation, in the water, a man in a canoe attempted, for his own amusement, to hem them in, so as to force them to go on land, which they were determined not to do. In the *melee* which ensued, a large alligator got so elevated from the water, by placing his arms on the side of the vessel, that he fell into the same, at full length, to the great dismay of the boatman, who being at the stern of the canoe, and finding the animal's head towards him, and fearing to jump out in the water, among the many alligators

all around, concluded to paddle his way to the shore. But as soon as he dipped his paddle in the water, he found that the animal began to move towards him. The canoe was narrow; there was no room for the animal to pass him. The parties were mutually embarrassed. The man hoped that his reluctant passenger would not attempt to kill him, unless he should obstruct the way. A happy thought struck him. He mounted with one foot on each side of the canoe; whereupon the alligator crawled between his legs, until from the stern of the boat, he plunged into the water, to the great joy of the man. Had the man disputed the right of way, a crocodilian battle would have resulted.

The brevity at which I have constantly aimed in this monograph, excludes many facts which I have either observed, or have derived from persons of good character, of accurate information, who have no theories but truth in view, in making statements concerning this animal and its habits. It certainly has great sagacity in distinguishing a friend from a foe. In many of my experiments, it showed not the least excitement or anger; while a negro, who had spit tobacco saliva in its eyes, could not approach without raising a storm of indignation, manifested by the animal rising on its legs, puffing and blowing like a bellows.

The absurd story, that alligators eat their own young, cannot be believed for a moment. A gentleman informed me, that one of his negroes having caught a young alligator, which whined like a young puppy, the parent came towards the negro with a rapidity he had never witnessed on other occasions—a kind of jumping motion, which caused the boy to run, after dropping his captive. I have been assured, when danger is imminent, that very young alligators run into the parent's mouth for safety. I have this statement from a highly respectable physician.

The following experiments, illustrative of the temperature of the alligator, made with an accurate thermometer, which was tested by freezing, boiling, etc.; and may be relied on. I have omitted to enumerate the duration and repetition of the experiments, for the sake of brevity. The thermometer was seldom changed short of ten or fifteen minutes, and never until it appeared stationary. These experiments, which might have been greatly augmented, are, if I may judge, quite sufficient to show, that Cuvier and his disciples greatly err, when they assert, that this animal approaches the hot blooded quadrupeds in temperature. It approximates not the hot blooded animals, but the mercurial column of the thermometer!

March 31st, noon—air 62° ; one alligator in the groins, etc., 57° —another $57\frac{1}{2}^{\circ}$; the water in which they reposed, about two inches deep, gave 57° . At 6, P. M., air 62° ; the flanks, axillæ, under the tongue, pharynx, and gullet, each 61° ; both the water in which their abdomens rested, and other water near at hand, gave exactly the same temperature. The day was cloudy.

April 1st, sunrise—cloudy, humid, air 60° ; alligator's flanks, etc., $59\frac{1}{2}^{\circ}$; gullet nearly 60° ; a little water in which they lay, $59\frac{1}{2}^{\circ}$; other water, near, 60° . Noon, air 63° ; alligators, and the water in which they lay, 61° ; other water 62° . At 5, P. M., air 67° ; alligator's 65° ; water two inches deep 64° ; other water 65° .

April 2d, sunrise—air $59\frac{1}{2}^{\circ}$; alligator's flanks and gullets, posterior

fauces, each 63° ; the water in which they lay, and which was now removed, gave $58\frac{1}{2}^{\circ}$; other water 59° .

April 3d, 7, A. M.—the animals and their cages are quite dry; air 64° ; groins, gullet, etc., each 63° . Noon, air 68° ; alligators 65. Sunset, air 64° ; alligators nearly 65, and dry.

April 4th, 1, P. M.—air 63° ; flanks $60\frac{1}{2}^{\circ}$; gullet 61° . Sundown, air, flanks and gullet, each 64° ; animals dry.

The following experiments are deemed relevant to this subject:—While engaged in making a most extensive series of thermometrical observations, illustrative of the diurnal and annual temperature of the Mississippi River, I have had a few opportunities of experimenting on its fishes, immediately after they were taken out of the water—an example of which is here subjoined. 1845, July 29, air at $5\frac{3}{4}$, at 6, and at $6\frac{1}{2}$, A. M., 76° ; River $85\frac{1}{2}^{\circ}$; a fish (*perca**) weighing about three pounds, was (after crushing its brain) placed on a plank, in a shade, with a thermometer thrust into the gullet. In two minutes, the temperature was 81° , in 3 m. 81° , in 5 m. $80\frac{3}{4}^{\circ}$, (dead) 5 m. 80° , (body flexible) 10 m. 80° , 10 m. $79\frac{3}{4}^{\circ}$, 20 m. $79\frac{1}{2}^{\circ}$, (now one hour—body somewhat rigid) 10 m. $79\frac{1}{2}^{\circ}$ (universal rigidity) 10 m. $79\frac{1}{2}^{\circ}$. During these experiments, the air of the spot had raised to 83° ; and had now, in one and a half hours, begun to communicate its caloric to the fish.

It may, perhaps, be said, that the crocodile of modern times differs from that of the ancient world. Fortunately there is a history extant, written with a pen altogether infallible; it reaches to the earliest era of our planet—THE FOSSILIFEROUS VOLUME OF NATURE. The author of the *Recherches sur les Ossemens Fossiles*, formed a new era. He had surveyed the face of the old, scarred earth, and numbered its animals. He penetrated below its surface—he *disinterred* the FOSSILIZED PAST. Thus Cuvier, like Columbus, discovered a new world! What the inimitable Bulwer says of the mysterious *future*, may, with little modification, apply to the *past*—anterior to Cuvier's great revelation concerning the fossil remains of eras so remote, as to bewilder the imagination: "upon that unknown and voiceless gulf of inquiry, brooded an eternal and impenetrable gloom—no wind breathed over it—no wave agitated its stillness;—over the dead and solid calm there was no change propitious to adventure—there went forth no vessel of research, which was not driven, baffled, and broken again upon the shore."

Thanks to Cuvier! Zoologists can now say with Dr. Buckland, in his *Bridgewater Treatise*, "that the fossil remains of the crocodilian family do not deviate sufficiently from living genera, to require any description."—(V. i., p. 191.)

MICROSCOPIC ADDENDUM.

The epidermis, cuticle, or scarf skin of the alligator, consists of a laminated horny substance, which, nevertheless, transmits the sense of touch with rapidity. A live coal placed on the skin, directly over the spine, caused an instantaneous manifestation of pain, which seemed to be acute.

* Family *Percide*, genus *Pomotis*. Mr. De Kay, *New York Fauna*, 4to.

The epidermoid laminae appears to be arranged like the slates or shingles on a house, one over-lapping another, as may be demonstrated by raising their edges by the point of a lancet, and pulling them from their connections, as in micaceous plates. Each lamina, though inappreciably thin, is without doubt, an aggregation of other similar laminae.

The superficial surface of one of these plates, is various and uncertain, being sometimes nearly as broad as the human nail. A lamina does not lie exactly horizontal, but dips or inclines slightly; its outer terminal margin, being black, and possessing an absorptive power over the spectrum, little inferior to charcoal itself.

This laminated stratum, is opaque only to a very limited extent along its margins, at which, will often be found, interspaces possessing more or less of that essential element of microscopic research, transparency. The plate constantly becomes more pellucid towards its inner termination.

The specimen here examined, was taken from a skin which had been dried for many years, portions of which, were used in that state, as well as after maceration from one day to six weeks. Maceration and trituration of the cuticle, with a suitable quantity of water, give a mixture, which, to the naked eye resembles black vomit.

The microscopic analysis of this substance when conducted in the *direct rays of the sun*, presents, like all other substances, which I have examined, (and they are not few,) certain ultimate phenomena, which will be described presently. And, although, the alligator's scarf skin is not a good type, or point of departure for the illustration of the general doctrine—the germ of which, only, I wish here to delineate, still it is sufficiently adapted to my purpose. Great as is my distrust, in my abilities in this branch of science, I cannot persuade myself, that my observations are mere optical illusions, or the figments of fancy—erroneous they may be. But as my method is, as I suppose, peculiar—the solar microscope, so called, having nothing to do with it, and as it has been practised at intervals for nearly two years, it cannot be considered altogether premature or hasty. Besides, I am far from thinking that my observations conflict with the general laws of light and of optical instruments.

An epidermic plate of the alligator, presents the three elements, which, so far as I have observed, constitute the structure of animals and plants, both liquid and solid, upon examination, by what, I shall call *solar analysis*. It would be, I repeat, utterly impossible in this place to give even an outline of the experimental proof, which I have accumulated in less than two years, and which has induced me to draw this conclusion. I cannot enter upon the objections which professed opticians, and microscopists may urge against a method, (I shall call it the solar method,) which is universally interdicted, involving as they do, the profoundest speculations concerning the refrangibility, the irisation,* the reflexion, the absorption, the entrance, the transit, the emergence, the color, the concentration—in a word, the general doctrines of light or the solar

* *Irisation*.—Webster has not admitted this necessary word, though he has *irised* and *irised*. The dictionary of the French Academy, has the adjective *irisé*, (that which presents the colors of the rainbow,) but not *irisation*!

spectrum, all of which may be sources of error with careless observers, and which, if they apply to my method, apply with, perhaps, more force (as I could show) to that usually pursued by indirect light, especially that of the lamp, so much recommended, though it is wholly useless, for the purposes of minute and exact observation. The method I have pursued, whether good or bad, is not followed. It is sufficient to mention the opinions of two of the most eminent, recent writers on this subject: Sir David Brewster says, (Ed. Ency.) "Microscopic objects are commonly seen *better in candle light than in day light, a fact which is particularly apparent when very high magnifying powers are employed*; and we have often found that very minute objects, which could scarcely be seen at all in day light, appeared with tolerable distinctness by candle light. So far as we know, the cause of this has not been investigated." Now, this is very plain to myself. In a good light, that is, in the direct rays of the sun, a focal point never can arise from an entire vessel or organ of any animal, even including those called the infusoria, but only from some portion or molecule of such vessel or organ. Hence, all structures as nerves, muscles, heart, &c., are, in a certain sense, annihilated, or become, as it were, structureless. This gentleman gives a list of what he calls *microscopic objects*, which he recommends, without indicating any preparation, as most suitable for examination, among which are the spider, bug, mole-cricket, glow-worm, leech, corals, sponges! Now, the true focal point for one hair of the glow-worm, will be extremely limited for that part, but cannot answer for another hair, much less for the animal's entire body, which, were it sufficiently pellucid, would present an indefinite, nay, almost infinite number of focal points. Dr. L. Mandl, lays it down as a microscopic axiom, to *avoid the direct light of the sun*, chiefly because it produces *irisation*! (MANDL ET EHRENBURG, *Traité du Microscope*). Dr. M. admits that a lamp has the same effect. I am unable to see any thing in his statements which justifies him in his love for a *dim*, and his *dread of a bright light*.

When the observations are properly conducted, the calorific rays, combined with the solar spectrum, including desiccation and certain molecular movements incidental to the same, so far from vitiating, really aid the experimental operations. The proper management of the light is the fundamental point. It is not *in the spectrum*, but upon its margins or boundaries where the eye must be fixed, in order to avoid the dazzling and other bad effects of a concentrated light.

Omitting all matters which are not essential to the intimate structure of animal and vegetable microscopic objects, as color and the like, three distinct things are seen in the direct solar light, and which I must explain, as they have no reference whatever to the terms used by others:

First, Infusoria: these animals have no resemblance to any of those called or described by the same name, or represented pictorially by Mandl, Ehrenberg, and others, and which have been arranged by Müller into 2 classes, 17 genera, and 373 species. I may call them *solar infusoria*, because seen in sun only. They are filiform, cylindrical, lead colored: all are exactly alike. They endure boiling and all degrees of heat short of incineration, and remain desiccated for indefinite periods, and may be triturated without destroying their vitality, that is, their power of motion. They always move in both dead and living matter,

whenever the intermedium, in which they are imbedded, is sufficiently *thin* or dissolved. Thus, in the cuticle of the Alligator, dried for many years, the infusoria were found abundant in all parts which were sufficiently transparent for examination, and, of course, rigid, but on triturating this lamina with a drop of water on a glass, the infusoria were set free and became active: so of many other substances. The bodies of the infusoria of authors, afford some excellent examples of this, owing to the great transparency of the former. If a portion of the body or limbs be selected, and be sufficiently thin, the solar infusoria will be distinct, and if the cohesion be sufficiently diminished, active, even while the animal which they help to constitute is yet alive. But if the animal be disintegrated, then the solar infusoria *all* become active. The infusoria of authors, are generally quite moist enough to allow this action, as soon as they are triturated or broken up. Could shells, and the like, in which they abound, be broken up, pulverised, and dissolved completely, these animals would, no doubt, become active immediately, as I have always found them to be when so treated.

A drop of blood, black vomit, milk, or the juice of berries, will afford a most satisfactory view if it be spread out sufficiently *thin*—a drop may be regarded as a “great globe,” flattened, it may be, in which these infusoria swim, one greatly above another, each having a different focal point corresponding to its position.

The solar infusoria move without ceasing, so long as the intermedium will permit. As the cohesion of the latter augments, the motions of the former diminish. Their motions are serpentine, presenting only a few curves. They do not possess the power to stem a strong current. They are types of perpetual motion, and of immortality—always moving, all being alike, and all apparently incapable of dying. Desiccation appears to be their hybernating condition.

The second general microscopic element, which the direct, concentrated solar spectrum discloses, is a spheroidal body, remarkable for its luminosity. These spheroids are numerous, and have nearly the same appearance in all substances. They possess no power of locomotion, or other indications of life, unless, perhaps, in a few cases. I have seen, several times, numerous spheroids of a similar size, which travelled in various directions, in a voluntary manner, like ants, with, sometimes, a rotatory motion.

The third element, in this solar analysis, is the most abundant of all, and may be called the *intermedium*, and is both solid and liquid in different substances, both in the natural and artificial states, appearing to be as structureless as water. It serves as a menstruum, bed or cement to the other two elements. It is rarely, perhaps never, as transparent as water. If it be liquid, desiccation will very generally cause fissures, like those of the Mississippi alluvion, after the subsidence of the water, during the action of the sun and wind. It seems to be homogenous, and has, with respect to light, various degrees of absorptive and transmissive power.

Whenever the cohesion of the intermedium is sufficiently overcome by the solvent action of water, or by the disintegration of the tissues, of which the infusoria form a component part, the latter invariably pass from a state of rest or sleep to that of perpetual activity. When the

intermedium passes from a liquid to the solid state, by slow or rapid desiccation, or when a live coal is placed on the opposite side of a plate of glass, so as to heat the substance nearly to ignition, no effect is produced on the infusoria, or spheroids, unless the intermedium be coagulated, or otherwise altered, so as not to be again susceptible to solution.

The solar infusoria are very distinct to all eyes—young, old, and middle aged. I have known children to express uncommon admiration on seeing them in minute portions of fresh blood, milk, the juice of a blackberry, black vomit, &c. It would really be strange, that all these persons, amounting to a considerable number, should be deceived.

The microscope used, though an exceedingly good one, possesses but a moderate magnifying power—a fact of great importance, with respect to distinctness of vision, in this method of examination. In a microscope of great magnifying power, all the objects here described, have been identified, but, less clearly, particularly with respect to the motion of the infusoria, which was seldom seen satisfactorily.

It is worthy of remark that the father of Microscopy, the most successful of all discoverers in this department of science, LEUWENHOECK, (who was born in 1632), never used microscopes of high power. “In all his microscopes,” says Brewster (Encyc.) “the lenses had *not a very high magnifying power*; and there is reason to believe that most of his discoveries were made more from the *distinctness* arising from the accurate figure and good polish of his lenses, than from the *greatness of their power*. Of the 26 microscopes which he presented to the Royal Society, only *one* had a focal length so small as one-twentieth of an inch, and all the rest were below *half an inch* in focal length.”

Dr. Mandl in his late work on the Microscope, maintains that heat kills the infusoria—“*la chaleur tue les infusoires*”—an indirect proof that the solar infusoria above mentioned, are peculiar, and, as yet, undescribed. This author admits that distinctness, clearness, and exactitude, cannot be obtained by a microscope of high magnifying powers, transcending 400 or 500 diameters—800 to 2000 being fallacious.

That the solar infusoria should survive boiling, and a concentrated heat but little short of combustion, is scarcely more wonderful, than the fact, now generally admitted with respect to the infusoria of authors, namely, that prolonged desiccation does not destroy the vitality of these animals: a drop of water recalls them to life, after a suspended animation of ages.

