PRELIMINARY DISCOURSE

ON

THE STUDY

OF

NATURAL HISTORY.

PART I.

ON THE RISE AND PROGRESS OF ZOOLOGY.

PRELIMINARY OBSERVATIONS. — DIVISION OF THE SUBJECT. — FIRST EPOCH. — ARISTOTLE. — PLINY. — SECOND EPOCH. — RONDELETIUS. — GESNER. — ALDROVANDUS. — MOUFFET. — TOPSAL. — MAURICE OF NASSAU. — MARCGRAVE. — PISO. — MERRETT. — GOEDARTIUS. — REDI. — SWAMMERDAM. — LISTER. — GENERAL REMARKS ON THE ERA OF WILLUGHBY AND RAY. — GREW. — PETTIVER. — ALBIN. — SLOANE. — SEBA. — THIRD EPOCH. — LINNÆUS. — ELLIS. — LINNÆAN SCHOOL. — RUMPHIUS. — D'ARGENVILLE. — REGENFUSS. — RŒSEL. — EDWARDS. — TREMBLEY. — GRONOVIUS. — REAUMUR. — COMPARISON BETWEEN LINNÆUS AND BUFFON. — LINNÆAN SCHOOL. — ARTEDI. — SULZER. — SEPP. — SCOPOLI. — SCHŒFFER. — HASSELQUEST. — OSBECK. — FORSKALL. — SPARRMAN. — PENNANT. — WHITE. — DRURY. — MARTINI AND CHEMNITZ. — WILKS. — FABRICIUS. — THUNBERG. — MÜLLER. — FORSTER. — VILLERS. — SCHRANK. — MOSES HARRIS. — CRAMER. — STOLL. — SCHREBER. —

PALLAS. — SCHROETER. — BORN. — MERREM. — HERMANN. — BLOCH. — SCHNEIDER. — SCHŒPF. — LATHAM. — SHAW. — SIR J. SMITH. — BERKENHOUT. — LEWIN. — OTHO FABRICIUS. — OLIVI. — ENTOMOLOGICAL ILLUSTRATIVE WORKS OF THIS PERIOD. — ERNST. — ESPER. — HÜBNER. — HERBST. — JABLONSKY. — VOET. — WOLF. — MINOR WRITERS. — PANZER. — PETAGNI. — ROSSI. — PAYKULL. — LESPEYRES. — GMELIN. — BUFFON'S SCHOOL. — PLANCHES ENLUMINÉES. — BONNET. — DE GEER. — BRISSON. — ADANSON. — DUHAMEL. — SONNERAT. — SONNINI. — LEVAILLANT. — FUESSLY. — THE MODERN FRENCH SCHOOL. — CUVIER. — DISCOVERY OF THE CIRCULAR NATURE OF AFFINITIES.

(1.) To form a just estimate of the relative position of any science at a given period, it is necessary that the prominent events in its history be rightly understood. It seems, therefore, expedient to commence this discourse with a slight sketch of the rise and progress of zoological science; or, more properly, of the progressive discovery of the forms, structures, and habits belonging to the animal world; a world replete with such an infinity of beings, each possessing so many peculiarities of habit and economy, that, notwithstanding the united efforts of human research for thousands of years, there is not one of them whose history, as yet, can be pronounced complete.

(2.) The vast and diversified field of enquiry over which zoology extends, and the many distinct portions into which it is now distributed, render it extremely difficult to embrace the whole in one general exposition. For it has happened, that at one period of time while our knowledge has made gigantic progress in one department, it has been stationary, or even retrograde, in others; and at

another epoch we find that original research has been abandoned, and the technicalities of system and nomenclature alone regarded. To meet the first difficulty, and to preserve, nevertheless, a connected narrative, it seems advisable to treat the subject historically; and pre-supposing certain epochs in this science, to detail the peculiar characteristics of each. This will of course lead to some enquiry into the merits of those who have successively promoted or retarded the progress of knowledge; or who have been the founders of systems and methods, which for a time have endured, and then been laid aside. The revolutions of science are almost as frequent, and often more extraordinary, than those of political institutions. Both are results, not so much of the talents or efforts of large communities acting simultaneously, as of the influence of some one individual, whose qualities, good or bad, have not unfrequently worked the overthrow of laws, and modes of thinking, which had long been supported by the voice of a nation. It is, therefore, the part of the natural not less than of the political historian, to trace the causes of such revolutions, as far as possible, to their sources; and not to rest contented with the bare enumeration of the facts themselves, or of the results which followed.

(3.) Nor is the above the only difficulty of the task before us. To estimate aright the progress of this science, it is essential to draw a just distinction between analogical research and systematic arrangement; or, in other words, between the minute investigation of the properties and characters of an animal, and its subsequent arrangement among other

animals. It has been the misfortune of those who have written — in some respects ably — upon the rise and progress of zoology, that this distinction has either not been perceived, or has been entirely set aside. Hence it has resulted that praise and blame have been frequently misapplied; while discoveries of the highest interest have been quite overlooked in the fancied importance attached to the maker of a system, or to the industry of a nomenclator. Without, at present, entering further into these essential differences between the labours of naturalists, we must bear in mind that all true knowledge of the laws of natural combination takes its rise from minute analysis; and that the value of a system is to be judged of according to the degree with which it arranges in harmonious order, all the various and infinitely diversified facts resulting from analysis. Of artificial systems there may be no end, because the materials of which they are composed show a diversity of relations: each system may differ from the other, yet each may have something to recommend it. But with the materials employed for their construction the case is quite different: the analysis of a species, if correctly made, remains for ever, unchangeable and unchanged: it is permanent; it cannot be gainsaid, nor does it perish with the system into which it may be incorporated. The system may be overthrown, yet the analysis remains. True it is that minute research is of more easy accomplishment than the power of generalising: the one requires only a simple accuracy of observation, the other an enlarged and comprehensive judgment. But, when once a system, like that

either of Aristotle or of Linnæus, has been framed, it is easy for a host of imitators to follow, each making some fresh modifications, or some small improvements upon the models before him; and thus dazzling the world with *a new system*, which the inventor would never have composed, had he been left to his own unassisted powers of combination. In estimating, therefore, the respective merits of the two classes of naturalists here alluded to, we shall be obliged to assign a much lower station to some names than has been done by our predecessors, and transfer that praise which has been bestowed upon them to others whose labours, although less brilliant, have more contributed to the advancement of science.

(4.) In reference to the above observations, we shall now take a rapid sketch of the history of zoology under the following epochs: — 1. Its foundation by Aristotle; 2. From the revival of learning to the time of Linnæus; and, 3. From the appearance of the Systema Naturæ of Linnæus, to that of the Règne Animal by Cuvier.

(5.) The state of natural history, in the early ages of the world, must ever remain more a matter of conjecture and of theory than of positive fact. Some acquaintance with the properties of animals was certainly possessed by our first parents, who were enabled, by the Divine agency, to assign names to the beasts of the field, and to distinguish such as were adapted to their wants. The wisdom of the wisest of men, also, was extended to the works of that God whom he worshipped; but these and similar

ntimations in ancient history, whether sacred or profane, must not be interpreted too literally, or be supposed to imply more than that the knowledge of natural history, possessed by the early inhabitants of the earth, was commensurate with what was known of astronomy or other of the physical sciences.

(6.) Passing over, therefore, those obscure ages, when all human learning was in its infancy, we may date the rise of zoology, as a study, from the time when the immortal Aristotle directed the powers of his mind to the animal world; and in his famous book, Περι Ζωων Ἱστοριας, first sought to define, by the precision of language, those more prominent and comprehensive groups of the animal kingdom, which, being founded on nature, are exempt from the influence of time and the mutability of learning. Had this extraordinary man left us no other memorial of his talents than his researches in zoology, he would still be looked upon as one of the greatest philosophers of ancient Greece, even in its highest and brightest age. But when it is considered that his eloquence, and his depth of thought, gave laws to orators and poets, — that he was almost equally great in moral as in physical science, and that no department of human learning escaped his research, or was left unilluminated by his genius, — we might be almost tempted to think that the powers of the human mind, in these latter days, had retrograded; and that originality of thought, and of philosophic combination, existed in a far higher degree among the heathen philosophers than in those who followed them. A moment's reflection, however, will show

that such ideas are grounded upon partial considerations, and they are at once refuted by such names as those of Newton and Bacon. Furthermore, it should be remembered that the most ordinary observer can readily distinguish a quadruped from a bird, a snake from a fish, and a vertebrated from a boneless animal. All these distinctions are obvious, and, therefore, known even to the vulgar. Nor does it require any great skill to express these differences in words. The same may be said of those secondary divisions by which a beetle may be known from a butterfly, and these, again, from a bee. It is not so much, therefore, from having embodied facts like these into classic language that the philosopher of Stagyra derives his high fame; it rather reposes upon the peculiar tact with which he brought the rules of philosophic reasoning to bear upon a subject hitherto neglected, — upon the extent and depth of his personal researches, — upon the clearness with which he arranged his results, — and, above all, upon those obscure perceptions which he acquired, while so employed, of hidden truths, which were only to be developed in subsequent ages. Nor should that innate grandeur of his mind be forgotten, which led him, in an age of universal superstition, to discard from his work all those popular tales, and fancies, and beliefs, which were received by the mass of his countrymen as religious truths, sanctioned by antiquity, interwoven in their history, and consecrated in their poetry. The death of this great father of our science was the death of natural history in the Grecian era. The splendour of his discoveries passed like a comet. He left no luminary

behind to follow in his wake, still less to throw additional light upon realms which he had but glanced upon. From the decline of Grecian learning until its partial revival among the semi-barbaric Romans, a long interval of darkness intervened; and it was only after a lapse of nearly 400 years that we find a solitary philosopher — the elder Pliny — calling the attention of his countrymen to the wonders of nature, and following up the pursuits of the Grecian sage. The Roman naturalist strove to follow in the path of his great predecessor; for, like him, he undertook to illuminate the whole empire of science and of learning: but he had neither the erudition nor the genius requisite for his gigantic project. His voluminous works rather show us a compilation of other men's thoughts and discoveries, than a selection of well digested information, or of original research. We find the wheat intermixed with an abundance of chaff: the nutritive grain and the useless straw are equally hoarded, and brought into the garner. Amidst all the polished graces of diction, great and diversified erudition, and no inaptitude for occasionally describing with clearness and precision, we look in vain for the powerful genius and the originality of thought of his great master, and we at once perceive that natural history, or rather zoology, under the Romans, had made a retrograde movement. The powerful mind of Aristotle, which led him to reject with disdain the credulous tales and fabulous stories of the age, can nowhere be traced in the writings of Pliny, whose works, on the contrary, abound in fables and in prodigies, at once manifesting that

weakness of mind inseparable from credulity, or that disinclination to investigate truth, which is the sure mark of a secondary order of intellect. It is difficult to account for this paucity of original information and abundance of fable in the writings of Pliny, seeing that he lived in an age when Rome might be said to have possessed the most magnificent menagerie the world ever witnessed. Her barbarous exhibitions of animal combats,—conducted on a scale of savage splendour, which almost shakes our credulity,—assembled within her walls fresh supplies of hundreds of living animals, collected from all the regions over which her empire extended, and augmented by the forced or voluntary contributions of those allies who sought the protection or friendship of the mistress of the world. These menageries were not only filled with lions and other ferocious animals, destined for the circus, but contained, in all probability, whatsoever was rare or curious among the more peaceable tribes; since these creatures frequently formed a conspicuous feature in triumphal processions, and were no doubt taken care of afterwards.* The Camelopardalis of northern Africa (C. *antiquorum*, Sw.) was well known to the Romans; but that of the southern regions, we may presume, was too far removed from their empire. Certain it is, however, that of all these advantages

* Pliny himself is the authority for these facts. He informs us that Quintus Curtius first began the custom. Scylla exhibited the terrific spectacle of a combat of 100 male lions; but this savage amusement was far outdone by Pompey, who assembled at one time no less than 600 of these beasts. Cæsar, also, had one of 400.

Pliny made but little effective use. If any further proofs were requisite to show the declension of natural history under the Romans, it would only be necessary to cite the fables and absurdities of Ælian, and one or two others, with whom expired all records of the science for nearly 1400 years.

(7.) The second era of our history commences with the revival of learning in the sixteenth century, and terminates with the institution of system by our celebrated countrymen Lister, Willughby, and Ray. It is difficult to trace the first dawn of natural history during this period, or to ascertain which was the first printed book that treated on the nature of animals. The *Ortus Sanitatis**, printed in 1485, a most curious and exceedingly rare book, is the earliest we have seen; and, to judge from the grotesque rudeness of its figures, was, perhaps, one of the very first attempts to represent animals by wood-cuts. Passing over, however, this and similar memorials of a dark age, the first writer who really deserves notice is Belon of Mans, who was born in 1517, and who seems to have made the history of birds his exclusive study. He may not have been the first writer on natural history, in regard to priority, since the revival of science, but he was most assuredly the first who treated the subject with any regard to system; and when we consider the unenlightened era in which he lived, and the diffi-

* Ortus Sanitatis. De herbis et plantis, de animalibus et reptilibus, de avibus et volatilibus, de piscibus et natatilibus, de lapidibus, &c. 1485. Small folio. Ascribed by some to a Doctor Cuba.