Alcide d'Orbigny,
né à Couëron (France)
en 1802

ALCIDE-CHARLES-VICTOR DESSALINES D'ORBIGNY (1802-1857)

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The name of Alcide d'Orbigny looms large in the study of Mollusca as any perusal of a systematic work in the field will show. His paleontological work is no less worthy of attention in spite of the fact that his books are now rarities. He traveled extensively in South America, visited North America on his return, and diligently described his finds in what are the foundation works of South American geology, paleontology, malacology, and added much to the knowledge of that continent's mammals and birds. Yet, unless some obscure work has escaped my eye, it seems that there is no account of his life and work in English save summaries (e. g. Zittel, 1908, p. 506) and mention in standard biographical works. In French, accounts of his life and work are no less scarce. The most extensive account is that of Fischer (1878). Roule (1933) and Lys (1957, 1958) have published short biographic accounts, the last two on the occasion of the centenary of d'Orbigny's death.

Even if his evolutionary and stratigraphic theories have now been discarded, the worth of his paleontological and natural history works should ensure that his life and work be better known in this country. In addition to the brief biographic information which he himself gives in his 'Voyage Pittoresque dans les deux Amériques' (1836, *passim)* I have used many secondary sources which I have listed in the References Cited. Of these, the most detailed is that of Fischer (1878) which also includes the list of d'Orbigny's works reproduced in this paper. In spite of their variety, these sources give us very little information on d'Orbigny's background, his father's career previous to settling in Couëron to practice medicine, and many other points which might shed some light on his character.

Of d'Orbigny senior, we do know that he had great interest in natural history; in collaboration with Fleuriau de Bellevue, he assembled a collection of marine animals of the coasts of Aunis and Vendée; together, they founded the first French regional museum at La Rochelle. They were in corrrspondence with Latreille, Savigny, Cuvier, Audouin, and Milne-Edwards who identified and described the rarest species for them.

Charles-Marie Dessalines d'Orbigny (1770-1856) had lived in Santo Domingo, had served as a naval surgeon and in 1802 was practicing medicine at Couëron when his son Alcide was born. Couëron is a small town with a population of only 4,338 in 1857 when it was described by Bescherelle (1857) in his great Geographic Dictionary as a good small port for provisioning and careening ships. It had a small glass bottle factory and fairs four times a year. It is situated on the right bank of the Loire River, department of Loire-Inférieure, in Brittany. Later the d'Orbignys moved to Esnandes, a smaller place with only 191 inhabitants in the department of Doubs (Franche-Comté) and later still to La Rochelle where d'Orbigny senior died in 1856, one year before his eldest son.

There is no doubt that the father's interest in natural history rubbed off on his sons who both had distinguished careers in the natural sciences. They roamed the beaches with their father and helped him collect the marine invertebrates which he classified for the Museum of La Rochelle. Both sons also helped their father with the illustrations of the invertebrates he studied for both of them were gifted draftsmen. Alcide's career was determined by an engrossing interest in almost microscopic organisms then classed as cephalopods (Polythalamous Cephalopods of Lamarck). Lamarck's subdivisions were hopelessly inadequate for he had included dibranchiate and tetrabranchiate cephalopods, Foraminifera, and pelecypods in a single family. Denys de Montfort had attempted to revise the Polythalamia but his drawings were obscure and his scientific integrity was in doubt. Alcide d'Orbigny spent seven years studying all the Foraminifera he could examine and then summarized his discoveries in the 'Tableau méthodique de la classe des Céphalopodes,' published in 1826; he was then only 24 years old but his system, although not a natural one, was such an improvement over previous ones that it won him immediate prestige and respect. He still considered the Foraminifera, whose name he coined, as cephalopods but separated them from the true cephalopods and divided them into 5 classes, 53 genera, and 600 species.

His basic characteristic was the arrangement of the chambers or segments of the shells. In modified form, d'Orbigny's classification is still used today. Throughout his life, d'Orbigny continued to study the Foraminifera, both living and fossil, but the honor of assigning them to the Phylum Protozoa was reserved for Dujardin who observed and correctly interpreted the nature of the living animal in 1835.

Soon after publication of his 'Tableau méthodique....' d'Orbigny was entrusted with a scientific expedition to South America. He left France in June 1826 and did not return until March 1834. In between, he collected assiduously from the Atlantic shores of South America to the Pacific, climbed the highest plateaus of the Andes and recorded thousands of observations which were to serve as the materials for several books and many papers.

An expedition to South America at that time was a priceless opportunity for a young scientist. The great Alexander von Humboldt, Spix and Martius, the prince of Wied-Neuwied, Auguste Saint-Hilaire, had collected and described the animals and plants of Brazil and Peru; but the geology and paleontology had barely been touched for the work of Richard Owen, Charles Darwin, Burmeister, and others was still in the future. It is to d'Orbigny's credit that he took full advantage of the opportunity and faithfully recorded his findings for posterity.

The collecting and preserving of natural history specimens occupied a great deal of time and involved a great deal of detail but d'Orbigny was also able to generalize and synthesize. For example, he early perceived that the Mollusca and Foraminifera of the Atlantic and Pacific coasts belonged to two quite distinct faunas. When C. B. Adams, P. P. Carpenter and A. A. Gould analyzed the marine faunas of Central America and Mexico they amply confirmed d'Orbigny's findings. The subject of zoological provinces was later taken up by Edward Forbes and his disciples, building on the bases established by d'Orbigny. He noted the distribution of animals according to latitude and the close parallel with their distribution with altitude, comparing these zonations with the distribution of marine animals according to depth.

In addition, he studied the geography, ethnography, and anthropology of South America, the latter sometimes uncomfortably close at hand; Fischer writes that he was with a party of South American soldiers besieged in Carmen by the Patagonians, and that he noted, from abundant subject material for observation, that their average height was only 5 feet 4 inches, thus disproving the errors concerning their gigantic height.

His work in Bolivia, then Upper Peru, was greatly facilitated by President Santa Cruz who gave him every encouragement and facility. This enabled him to complete the triangulation begun by the Englishman Pentland and to publish excellent (for the time) geologic and geographic maps of Bolivia.

Upon his return to France in 1834, d'Orbigny published the results of his South American voyage in nine volumes, the last of which appeared in 1847. His work was praised by Elie de Beaumont who wrote 'This immense work presents in an almost encyclopedic framework one of the most extensive monographs ever given on any region of the earth.' It was to be surpassed in time; but it still remains an impressive accomplishment.

It would seem that the identification, study, illustration, and writing of the text of this vast work would be sufficient to occupy the energies of one man, yet d'Orbigny continued his studies on the Foraminifera, collaborated with Férussac in a work on cephalopods, with Webb and Berthelot on the natural history of the Canaries, with Ramon de la Sagra on that of Cuba and the West Indies. He also published a natural history of the crinoids, a work on the Birds of Europe, many short papers on the habitat of pelecypods, and a series of paleontologic memoirs on such diverse areas as the steppes of the Caspian Sea, the Caucasus, and the Crimea, European Russia and the Ural Mountains for insertion in the works of Murchison, de Verneuil, and of Keyserling. Finally, he began work on his encyclopedic 'Paléontologie française' to which he devoted the last years of his life.

As we shall see, his paleontological and stratigraphic works irritated both zoologists and geologists. Busy with the collecting and publication of his materials, d'Orbigny paid little attention to his financial affairs and to the mounting chorus of criticism that rose from official scientific circles. He seemed to suppose, with some naïveté, that it was sufficient to deserve a position to obtain it. When official science failed to offer him one, he finally asked for an appointment as Professor, but was turned down. Still, his reputation was growing and in spite of his critics, Paleontology was coming to be recognized as a science. He had a large following, who were unable to convince the bureaucracy of his worth; they did manage to convince the new Emperor of the French, Napoleon III, of d'Orbigny's merit; he cut through the massive knot of red tape by creating a new chair of Paleontology at the Muséum d'Histoire naturelle and appointed d'Orbigny as its first incumbent.

This was not the end of d'Orbigny's troubles; his reaction to unfriendliness and ill-concealed jealousy was to retreat to his laboratory and to try to forget his detractors by prolonged hard work. More and more he shut himself up with his beloved collections; but this kind of life impaired his health. He developed a heart ailment and died, after a year of pain, on the 30th of June, 1857.

After more than a hundred years have passed since his death, it is difficult to see why his theories should have aroused such antagonism, brought on such unkind criticism, and conduct bordering on persecution and ostracism on the part of the greatest personalities of French science at the time. Let us examine these doctrines and place them, if we can, within the framework of French scientific thinking in the middle years of the nineteenth century.

The 'Prodrome de Paléontologie stratigraphique universelle' (1850) was conceived on a grand scale. It was to include descriptions and stratigraphic range of all fossil species, arranged systematically. D'Orbigny followed Buffon's advice which the latter had given his scientific heirs when he wrote: 'It is especially in the shells and fishes, first inhabitants of the globe, that we can count a greater number of species which no longer survive; we shall not undertake here to give an enumeration of them, which, although very lengthy, would still be incomplete; this work on ancient nature would require by itself more time than remains for me to live, and I can but recommend it to posterity.' (Buffon, Minéraux, p. 156). D'Orbigny took up the challenge and used a then new approach. He considered the name and nature of the fossil to have but a secondary importance, overridden by that of age. He wrote: 'The first concept to obtain in a paleontologic study (Prodrome, Paléont., v. I, p. xv) is the date. Without these preliminary researches, no paleontology is possible, or merely chaos. It seems to us that this principle has not been understood, for most often the procedure has been in the opposite direction.' Consequently, he divided the sedimentary column into 27 stages, distinguished by names with uniform endings, containing 27 extinct faunas. When a species had been recorded for two or more formations, he observed that almost always this was due to errors of determination. Gradually, he came to consider as proved that no species survived from one stage to another, and that therefore Nature presented the aspect of 28 distinct creations (including the present fauna), since life had been renewed 28 times on the surface of the globe. The idea was not popular in his day nor is it accepted now by geologists and paleontologists.

D'Orbigny taught these ideas and incorporated them into his 'Cours élémentaire de Paléontologie' (1852). In this textbook, d'Orbigny stated his views as follows: 'An initial creation appeared in the Silurian stage. After the annihilation of the latter, by some geologic cause, after a considerable lapse of time, a second creation took place in the Devonian stage; and successively 27 times, distinct creations have repopulated the entire earth with its plants and animals, after each geologic disturbance which had destroyed everything in living nature. Such is the fact, the certain but incomprehensible fact, which we merely observe without seeking to penetrate the superhuman mystery which surrounds it.' This was out-Cuviering Cuvier but d'Orbigny had the agreement at least of Agassiz and d'Archiac among his paleontological contemporaries, and of Elie de Beaumont in the geological fraternity. On the whole, however, the zoologists resented his authoritarian attitudes on taxonomy and the geologists resisted his reworking of the geologic column to conform with his 28 successive creations. There was undoubtedly an element of jealousy involved at the immense luck of this young man getting the opportunity of the century in the field of natural history; at his outstanding industry in working up and publishing his materials; and even at his popular success as a lecturer. The personal attacks we must leave in the dusty archives of the time to concentrate on the scientific criticism, of which two examples should suffice.

Deshayes (Description des Animaux sans vertèbres du bassin de Paris, vol. 2, p. 171) wrote: 'In sum, what kind of picture does the Paris Basin offer us? Appearances of species and their more or less rapid extinction; the ones resisting little to causes of destruction, others a little more, others still more, all, in the end, disappearing at certain points, the more hardy serving as a common link for all the parts of the whole, and the others relating between themselves the subdivisions of lesser importance.'

Philippi (1808-1904) who also worked on the faunas of South America, was even sharper in his criticism when he wrote 'There is no separation between the Eocene, the Miocene, and the Pliocene; our distinctions are purely subjective and misleading; creation has always continuously and slowly continued its work.'

No one today subscribes to d'Orbigny's theory of successive creations except possibly rare members of the ultra-reactionary fringe of fundamentalist religious sects who might see in it a way of disproving evolution. Nevertheless, his divisions of geologic time, his stages, were established with such care and clarity that they have been adopted not only for France but for most of the world.

The overwhelming preoccupation with Darwinian evolution which absorbed the attention of biologists after 1859 caused d'Orbigny's theory to be forgotten. Nevertheless, as early as 1878, that discerning malacologist Paul-Henri Fischer (1835-1893) who succeeded Deshayes at the Muséum and was well aware of its half-concealed feuds, could write in the Bulletin of the Geological Society of France that d'Orbigny '....owed his superiority as a paleontologist and geologist to the knowledge he had acquired in his travels and by practicing zoology. His doctrines on the chronology of fossil organisms, in spite of their exaggeration, his immense paleontological works, in spite of the errors inevitable in a large work, have renewed the science in our country and assured our compatriot a well deserved place among the great geologists of this century.'

A century after his death, d'Orbigny was honored (e.g. by Lys, 1957, 1958) as the 'founder of a universally accepted classification of the Foraminifera.' No less important is the fact that his stage names (e. g. Sinemurian, Toarcian, Bajocian, Bathonian, Callovian, Albian, Cenomanian, Turonian, Senonian, to cite only the Mesozoic ones) have been adopted, as Fischer pointed out, throughout the world; and more, that the stages he missed have been named after the same method by his successors, Desor, Coquand, Renevier, Thurmann, Kilian, Toucas, and many others.

Finally, any attempt to state the position of d'Orbigny as a geologist or a zoologist is still difficult more than a hundred years after his death. Let it suffice to say that he made mistakes, being human; that he worked hard and wrote much, being entranced with nsture and the animal kingdom; that he was neither the shameless scoundrel that his enemies saw in him nor the great prophet of paleontology which his admiring followers called him.

LIST OF ALCIDE D'ORBIGNY'S WORKS COMPILED BY PAUL-HENRI FISCHER (1878, PP. 450-453)

Monographie d'un nouveau genre de Mollusques gastéropodes de la famille des Trochoïdes, nommé Scissurelle (Mem. Société d'Hist. nat. Paris, t. I); 1823.

Notice sur deux espèces du genre Ptérocère, observées dans le Calcaire Jurassique du département de la Charente-Inférieure (Ann. Sc. nat., t. V); 1825.

Notice sur les becs de Céphalopodes fossiles (Ann. Sc. nat., t. V); 1825.

Tableau méthodique de la classe des Céphalopodes (Ann. Sc. nat., t. VII): 1826.

Voyage dans l'Amérique méridionale, 9 vol. in-4^{o}; 1834-1847.

Notice sur un nouveau genre de Cétacé, des rivières du Centre de l'Amérique méridionale (Nouv. Ann. Muséum d'Hist. nat., t. III): 1834.

Synopsis terrestrium et fluviatilium Molluscorum Americanorum (Mag. Zool., t V); 1835.

Galerie ornithologique des Oiseaux d'Europe (52 livraisons); 1836-1838).

Mémoire sur des espèces et sur des genres nouveaux de l'ordre des Nudibranches observés sur les côtes de France (Mag. Zool., t. VII); 1837.

Mémoire sur une seconde espèce vivante de la famille des Crinoïdes ou Encrines, servant de type au nouveau genre Holope *(Holopus)* (Mag. Zool., t. VII); 1837).

Description d'une nouvelle espèce du genre Coroucou (Mag. Zool., t. VII); 1837.

Mémoire sur la distribution géographique des Oiseaux passereaux dans l'Amérique méridionale. (C.-R. Ac. Sc., t. VII); 1838.

Nouvelle espèce du genre de Zoöphytes échinodermes nomme Galérite (Rev. Zool., t. I): 1838.

Note sur le genre Caprine (Rev. Zool., t. II); 1839.

Histoire naturelle générale et particulière des Céphalopodes acétabuliferes vivants et fossiles; 1839-1848 (en collaboration avec de Férussac).

Mémoire sur les Foraminifères de la Craie blanche du bassin de Paris (Mém. Soc. géol. France, lre sér., t. IV); 1840.

Mollusques, Echinodermes, Polypiers, Foraminifères des Îles Canaries, in Webb et Berthelot: Histoire des Îles Canaries; 1839-1840.

Ornithologie, Foraminifères Mollusques de l'Île de Cuba et des Antilles, in Ramon de la Sagra, Histoire naturelle de Cuba; 1839-1843.

Histoire naturelle générale et particulière des Crinoïdes vivants et fossiles, comprenant la description zoölogique et géologique de ces animaux; 1840.

Paléontologie française. Description zoölogique et géologique de tous les animaux mollusques et rayonnés fossiles de France. lre partie: terrains crétacés: Céphalopodes, Gastéropodes, Lamellibranches, Brachiopodes, Bryozoaires, Echinodermes; 1840-1856; -- 2e partie: terrains jurassiques: Céphalopodes, Gastéropodes; 1842-1856.

Considérations paléontologiques et géographiques sur la distribution des Céphalopodes acétabulifères (Ann. Sc. nat., 2e sér., Zool., t. XVI; et Bull. Soc. géol., lre sér., t. XII); 1841.

Considérations zoölogiques, géologiques et géologico-géographiques sur les Ammonites du terrain crétacé (Ann. Sc. nat., 2e sér., Zool., t. XVI); 1841.

Nouvelle espèce de Volute (V. Lagillertiana) Rev. Zool., t IV); 1841.

Description de quelques espèces de Mollusques fossiles de France (Rev. Zool., t. IV); 1841.

Considérations sur les Céphalopodes des terrains crétacés (Ann. Sc. nat., 2e sér., Zool., t. XVII); 1842.

Mémoires sur deux nouveaux genres de Céphalopodes fossiles (les *Conoteuthis* et *Spirulirostra)*, offrant des passages d'un côté entre la Spirule et la Sèche, de l'autre entre les Bélemnites et les Ommastrèphes (Ann. Sc. nat., 2e ser., Zool., t. XVII); 1842.

Coquilles et Echinodermes fossiles de Colombie, recueillis de 1821 a 1833, par M. Boussingault; 1842.

Note sur des oeufs de Mollusques recueillis en Patagonie (Ann. Sc. nat., 2e ser., Zool., t. XVII): 1842.

Quelques considérations zoölogiques et géologiques sur les Rudistes (Ann. Sc. nat., 2e ser., Zool., t. XVII; et Bull. Soc. geol., lre ser., t. XIII); 1842.

Considérations générales sur le grand systeme tertiaire des Pampas (C-R. Ac. Sc., t. XIV); 1842.

Considérations générales et coup d'oeil d'ensemble sur les grands faits géologiques dont l'Amérique méridionale a été le théâtre (C-R. Ac. Sc., t. XV); 1842.