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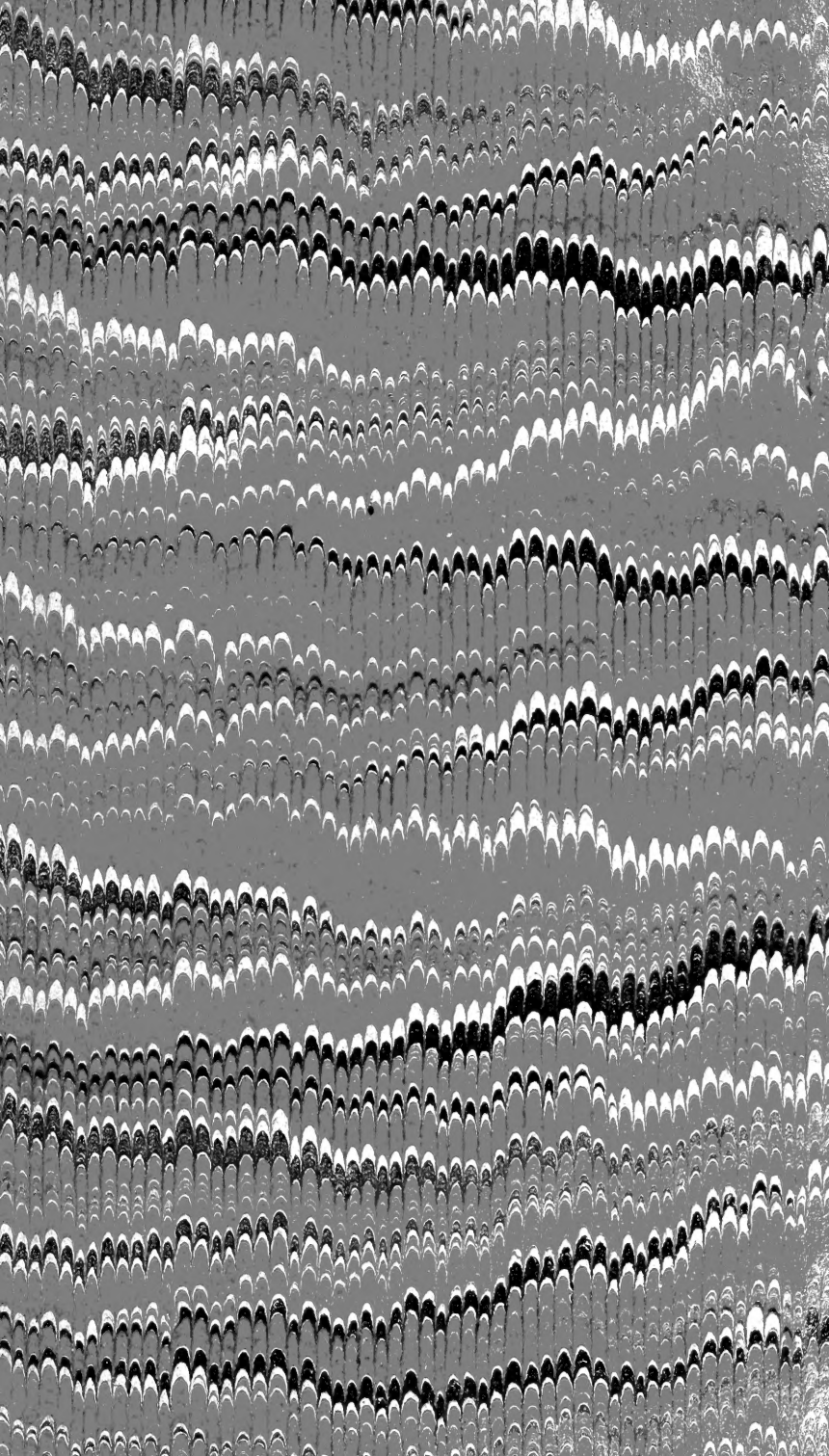
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THE
EOCENE AND OLIGOCENE BEDS
OF THE
PARIS BASIN.

0
GEOLOGISTS' ASSOCIATION.

THE

HARVARD

Eocene & Oligocene Beds

OF THE

PARIS BASIN.

BY

GEORGE F. HARRIS, F.G.S.,

AND

HENRY W. BURROWS, A.R.I.B.A.

*(A Paper read before the Geologists' Association,
on April 3rd, 1891.)*



SEPTEMBER 23RD, 1891.

^{c.}
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E R R A T A .

| | | | |
|------------------|---|--|--|
| Page 19, Line 34 | } | For <i>Dissostoma mummia</i> , read <i>Dissostoma mummia</i> . | |
| „ 20, „ 17 | | | |
| „ 22, „ 2 | | | |
| „ 30, „ 1 | } | For <i>Dissostoma mummia</i> , read <i>Dissostoma mummia</i> . | |
| „ 32, in margin | | | „ <i>Astrea-marls</i> , read <i>Ostrea-marls</i> . |
| „ 38, Line 6 | | | „ <i>Jurre</i> , read <i>Jeurre</i> . |
| „ 44, „ 27 | | | „ (see p. 111), read (see p. 109). |
| „ 60, „ 40 | | | „ <i>Cistella Chevalieri</i> , read <i>Cistella Chevallieri</i> . |
| „ 66, Column 5 | | | „ <i>Soletellina</i> , read <i>Solenotellina</i> |
| „ 83, „ 30 | | | „ <i>Dissostoma mummia</i> , read <i>Dissostoma mummia</i> . |
| „ 95, „ 48 | | | „ <i>Volutolyria Riga iti</i> , read <i>Volutolyria Rigaulti</i> . |
| „ 113, Line 2 | | | „ 1881, read 1889. |

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Preface.

BELIEVING that it would be useful for the members of the Association to have a concise account of the Eocene and Oligocene beds of the Paris basin laid before them, according to the most recent views of Geologists who have written on the subject, we beg to submit the following description of that interesting area for their consideration. In doing so, it may be stated that we were led to study the Paris Tertiaries from a conviction that it was impossible to satisfactorily solve many important stratigraphical and palæontological problems by an examination of English beds of corresponding age alone—and we have not been disappointed. In fact, at the outset, we will go so far as to say that no adequate conception can be formed as to the meaning and value of our own Tertiary beds and their organic remains without conjointly studying those on the other side of the Channel—especially in regard to the palæontological aspect of the subject. Attempts hitherto made to correlate the Tertiary beds of England with those of France and Belgium have been mainly based on the evidence afforded by the Mollusca, and rightly so, seeing that the remains of these latter are so abundantly distributed throughout the whole area. Their occurrence in such large numbers, and in such a perfect state of preservation, in the Paris basin enables us to work out the sequence and life history of the Eocenes and Oligocenes with much greater facility and precision in that area than in England or Belgium; and the student will, consequently, do well to direct his attention to the French area in the first instance. In this connexion, allusion may be made to the fact that many of the recognised English Lower Tertiary Mollusca have been referred to species occurring in the Paris basin, and already described by French authors; and that the types of these must consequently be sought in that area. In order to determine accurately many of the genera and species, it is absolutely necessary to possess perfect specimens; and these, so commonly found in the Paris Tertiaries, are exceedingly difficult, and sometimes impossible, to obtain from the English beds of the same period.

In studying this subject we have paid many visits to the Paris basin, both separately and together; have seen practically all the typical sections described in the following pages; and have traced the beds over considerable areas. To a certain extent, therefore,

we speak from personal experience, and have ventured to pronounce judgment on many disputed points. This paper makes no attempt at correlation with English beds, although we have deemed it advisable to give the generally accepted classification by reproducing the views of Professor Prestwich, F.R.S. (see table, p. 2). At the same time, we do not necessarily endorse this classification in its entirety.

During the preparation of this work we have received assistance from various Geologists, both at home and on the Continent; and we gladly avail ourselves of this opportunity to acknowledge the same. We have to thank Dr. Henry Woodward, F.R.S., for his kindness in permitting us to examine in detail the magnificent collection of Paris basin Tertiary Mollusca contained in the British Museum (Natural History); to M. Cossmann we are indebted for much valuable information and co-operation in the revision of the lists of fossil Mollusca, as well as for the valuable additions given in Appendix I.; M. Gustave Dollfus has kindly looked over the proofs relating to the stratigraphy of the basin and assisted us in various ways; whilst Dr. Maurice Hovelacque has been our guide in many of the classical districts, and his maps and note-books have most generously been placed at our disposal during our different excursions in the Parisian area. Mr. R. B. Newton, F.G.S., of the Natural History Museum, has aided us in revising the nomenclature of the Mollusca; Messrs. A. Smith Woodward, F.G.S., and J. W. Gregory, F.G.S., of the same Museum, have critically examined and revised those portions of the palæontological section relating to the Vertebrata and Echinoidea respectively; Mr. J. Starkie Gardner, F.G.S., has looked over our remarks concerning the fossil plants; and Mr. C. Davies Sherborn, F.G.S., has assisted us with the bibliography. We have also to record our appreciation of the many invaluable suggestions made by Mr. F. A. Bather, M.A., F.G.S., in the course of his editing and passing the work through the press. Lastly, we have to thank the Council of the Geologists' Association for their kind consideration in issuing this lengthy paper as a separate publication.

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August, 1891.

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GEOLOGICAL MAP OF THE PARIS BASIN

Based on the Carte géologique
de la France to scale 1:500,000



| | | |
|--------------------------|-----------|------------|
| | | |
| Phocène | Oligocène | Mésozoïque |
| | | |
| Paléozoïque & Volcanique | Miocène | Pliocène |

0 20 40 60 80 100 KILOMETRES

THE
EOCENE AND OLIGOCENE BEDS
OF
THE PARIS BASIN.

THE EOCENE BEDS.

It is difficult to define the precise geographical limits of the Paris basin Tertiaries, for the reason that on the north and south the beds insensibly pass, as small outliers, or *en masse*, into those of adjacent Tertiary areas. On the north-east they are bounded by those of French Flanders and Belgium, and on the south and south-west by those of the Loire; and any attempt to draw the exact boundary lines of the basin in these latter areas must be an exceedingly arbitrary one. The limits of the basin are more clearly defined on the east by Cretaceous rocks, and on the west by Cretaceous flanked by the Palæozoic and eruptive rocks of Brittany. A glance at the accompanying map will show the general position of the immense district included within this area.

The Tertiary beds of the Paris basin everywhere repose on the Chalk, except, perhaps, in the case of a few small outliers to the north where Lower Cretaceous rocks come to the surface. The junction between the Tertiary beds and the Chalk is often very uneven, and there, also, the bed of green-coated flints, so characteristic of the horizon over north-west Europe, is met with.

Before commencing the detailed description of the beds we may state that, as the Paris basin is so large, and as certain of the beds have only a local development, it is occasionally difficult to correlate them one with the other, or to give their exact succession or superposition. Some formations, however, have fortunately a much greater extension, and are clearly traceable over large tracts, so that the debatable ground of the more local beds referred to is brought within very narrow limits vertically.

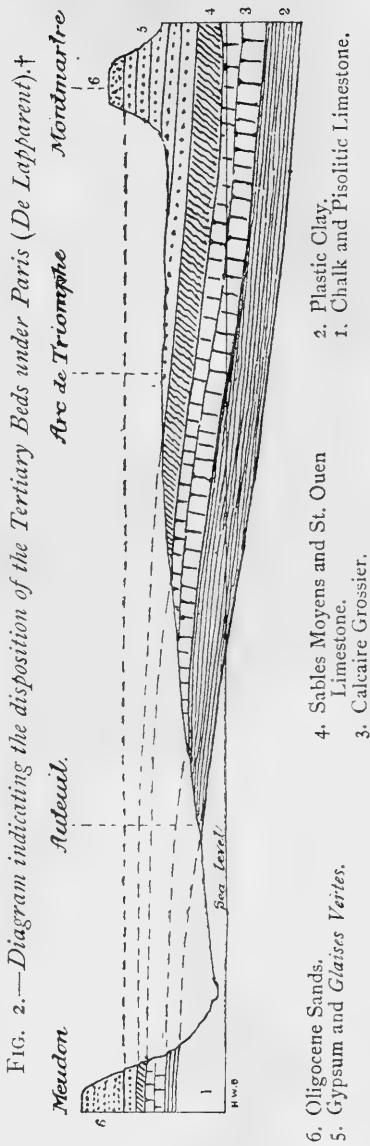
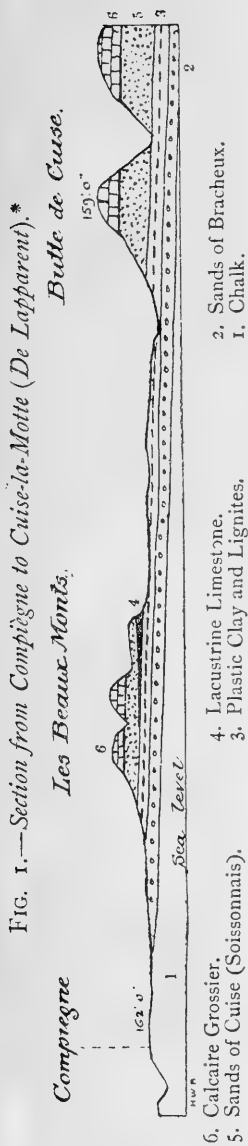
The dispositions of the Secondary and Tertiary beds of the basin, together with their inclinations with reference to each other, and the directions of the different axes of such inclinations have been well described by M. Dollfus.*

* *Bull. Serv. Carte Géol. France*, No. 14, t. ii. (1890), Paris.

Correlation of the Eocene of England, Belgium, and the Paris Basin.
(After Prestwich. †)

| | ENGLAND. | BELGIUM. | PARIS BASIN. |
|---------------|--|--|--|
| Upper Eocene. | a. Barton beds. | a. Wemmelian. | a. Sables Moyens, or Grès de Beauchamp. |
| | b. Bracklesham beds=Upper and Middle Bagshots. | Laekonian and Bruxellian. | b. Upper Calcaire Grossier. |
| | b.* Middle Bagshots. | | b.* Glauconie Grossière. |
| Lower Eocene. | <i>Wanting.</i> London sands=Lower Bagshot. London clay. | Pamiselian. Upper Ypresian. Lower Ypresian. | Sands of Cuisse-la-Motte. <i>Wanting?</i> |
| | Oldhaven, or Basement beds. Woolwich and Reading beds. | ? Upper Landenian. | Sables Inférieurs of the Soissonnais, including the marls of Rilly, the Argile Plastique and "Lignites," and the sands of Bracheux, Châlons-sur-Vesle and Rilly. |
| | Thanet sands. <i>Wanting.</i> | { Lower Landenian and Heersian. Calcaire de Mons. | { Sands of St. Omer, Douai, and the lower sands of La Fère. <i>Wanting.</i> |

†. Prestwich, *Quart. Journ. Geol. Soc.*, vol. xlv. (1888), p. 108.



* De Lapparent. *Traité de Géol.* Paris, 1885, p. 1132, fig. 559.

† *id.* p. 1129, fig. 558.

CLASSIFICATION OF THE PARIS BASIN EOCENE.

| | | | | |
|---------------------|---|-------------------------|-------------------------------------|--|
| Parisian ... | { | f. Ligurian..... | 13. Gypsum and marls. | |
| | | e. Bartonian ... | 12. Limestone of St. Ouen. | |
| | | d. Lutetian..... | 11. Sables Moyens. | |
| | | c. Ypresian ... | 10. Calcaire Grossier. | |
| Suessionian. | { | b. Sparnacian .. | 9. Sands of the Soissonnais. | |
| | | | 8. Sands of Sinceny. | |
| | | a. Maudunian.. | 7. Lignites of the Soissonnais, &c. | |
| | | | 6. Plastic clay. | |
| | | | 5. Rilly limestone. | |
| | | | { | 4. Sands of La Fère and Châlons-sur-Vesle. |
| | | | | 3. Sands of Bracheux. |
| 2. Marls of Meudon. | | | | |
| | | 1. Pisolitic limestone. | | |

The word Suessionian (*Suessonien* of d'Orbigny) is derived from the Latin name of Soissons—*Suessiones*; Maudunian from Meudon; Sparnacian from *Sparnacum*, Épernay; Ypresian from Yprès (Belgium); Lutetian from *Lutetia*, Paris; Bartonian from Barton (Hants); Ligurian from a district of north-west Italy.

1. PISOLITIC LIMESTONE.

At Meudon, near Paris, this bed is seen resting on the Chalk; typically it is a yellow limestone composed of small rounded grains and largely made up of pieces of shells. The same bed has also been found, amongst other places, at Bougival, Vigny, Laversine, Ambleville, Montainville, Flins, Montereau, La Faloise, and Mont-Aimé near Vertus. Its thickness varies from 6 feet 6 inches at Meudon to 162 feet at Mont-Aimé, and, following the different localities, the lithological character somewhat changes. The following fossils of this horizon may be cited as characteristic:—*Nautilus danicus*, *N. Heberti*, *Trochus Gabrieli*, some large *Cerithia*, *Crassatella pisolithica*, *Corbis multilamellosa*, *Cardium*, *Lima*, *Ostrea* and *Cidaris Forchhammeri* (*C. Tombecki*). A glance at this fauna at once shows that the Pisolitic Limestone is a passage bed between the Secondary and Tertiary formations; hence, like other similarly-situated beds in Belgium and elsewhere, it has suffered many vicissitudes—at one time being classed with the former, and at another with the latter. But the incontestable affinities of the major part of the fossils with those of the *Calcaire de Mons*, in the south of Belgium, lead us to follow those who include the "*Calcaire pisolithique*" in the Tertiary; we are nevertheless of opinion that it is older than the Belgian bed referred to. It seems to occupy a position intermediate between the *Calcaire de Mons* and the *Tufeau de Ciply*, and as such should be classed with the Palæocene series of continental geologists. For the sake of clearness, however, we have not included the fossils found in this bed in the accompanying list of mollusca (p. 64).

2. MARLS OF MEUDON.

THESE local marls, which are well developed at Meudon, are occasionally very strontianiferous. They are white, unctuous, and contain 20 per cent. of carbonate of strontian, 75 per cent. of lime, and 5 per cent. of clay.* They are many yards in thickness, and have been divided into two parts. (1) The lower, containing hard nodules of limestone, apparently rolled, with *Potamides inopinatus* and other mollusca, which M. de Lapparent thinks† are derived from the destruction of a bed contemporaneous with the *Calcaire de Mons*; and (2) the upper, having concretions fissured with *Viviparus aspersus*, *Rillyia rillyensis*, *Helix hemispherica* and other shells, the whole presenting much analogy with the fauna of the Rilly beds presently to be described. Professor Prestwich, F.R.S., states,‡ hesitatingly, that he should feel disposed to refer all the lower Tertiaries of Meudon to a much higher horizon, and to classify them with our Woolwich and Reading series.

3. SANDS OF BRACHEUX.§

As a general rule these sands repose directly on the Chalk. At Bracheux, near Beauvais, they are about thirty-nine feet in thickness, very glauconitic, and contain *Ostrea bellovacensis*, *Arctica scutellaria*, *Cucullæa crassatina*, *Axinea terebratularis*, *Venericardia pectuncularis*, *Volutilithes depressus* and other mollusca, the more important of which have been given in a list by Prof. Prestwich.|| Other fossiliferous localities exist near Beauvais, but the shells require to be treated on the spot and carefully removed, as they are very friable. We were informed that fossils could be obtained at Abbecourt and Noailles; but a visit to the last-mentioned place, although showing a magnificent section well repaying the visit, was disappointing from a palæontological point of view.

4. SANDS OF LA FÈRE AND CHÂLONS-SUR-VESLE.

THE sands of La Fère in the Aisne, which form another local bed resting on the chalk, are composed of very fine sands with grains of glauconite, and contain a small quantity of argillaceous or calcareous matter. They have a total thickness of about twenty feet. The *glauconie inférieure* is a bed on this horizon, well

* Jannettaz, *Bull. Soc. Géol. Fr.*, 2^e sér., . xxix. (1872), p. 41.

† De Lapparent, *Traité de Géol.*, 2 ed. (1885), p. 1127.

‡ Prestwich, *Quart. Journ. Geol. Soc.*, vol. xlv. (1888), p. 90.

§ In describing these sands at this stage we do not necessarily controvert the opinion of those who have given reasons for placing them higher in the Tertiary series. This is not a correlation paper, and we cannot, therefore, discuss the points at issue; the order here adhered to is that adopted by the majority of French geologists. In any case the Sands of Bracheux are of Lower Eocene age.

|| Prestwich, *op. cit.*, pp. 96, 97.

developed in Picardy between the Oise and the Somme, which has formed the subject of a special work by M. De Mercey.*

At Châlons-sur-Vesle,† Jonchery, Brimont, &c., a bed about thirty-two feet in thickness of yellowish grey sandstone in three divisions is found reposing on the chalk; whilst above come thirty-two to thirty-nine feet of siliceo-calcareous sands with a rich fauna at the first mentioned place, including *Corbula regulbiensis*, *Protocardia Edwardsi*, *Ostrea bellovacensis* and *Beloptera Levesquei*. At Jonchery also the sands are exceedingly fossiliferous.

5. RILLY LIMESTONE.

At Rilly-la-Montagne, near Rheims, a series of beds is found on the Chalk, and their precise position in the Tertiary series has long been a matter of dispute with geologists. The following is a section of the large sand-pit at that place.

Section at Rilly,‡

- k. Yellow sand.
- j. Bluish clay.
- i. Lignites with *Cyrena*.
- h. Yellow, blue or brown clay, reposing on white marl; the surface of this clay is clearly marked.
- g. White marl, very argillaceous, sometimes yellowish, without calcareous concretions, worked for hydraulic lime.
- f. Bluish clay, plastic, irregular, but with a horizontal surface.
- e. Marl, with numerous small concretions of crystalline limestone, without fossils, makes a poor hydraulic lime, and at the base has blocks of hard yellowish crystalline limestone full of fossils.
- d. Yellow sand.
- c. Very pure white sand, without pebbles or fossils, but with angular fragments of hyaline quartz.
- b. Ferruginous sand, sometimes agglutinated, with pebbles and impressions of *Cardium*.
- a. Chalk, having its surface pierced by boring mollusca.

The lower beds of this section, as at other exposures in the vicinity, have yielded marine fossils very analogous to those of Brimont, Jonchery, Châlons-sur-Vesle and Bracheux. The bed *e* is the type of the celebrated Marl and Limestone of Rilly, with the remains of land and marsh-loving mollusca such as *Viviparus aspersus*, *Physa gigantea* and *Helix hemisphærica*. The bed *i* with *Cyrena* indicates the presence of the "Lignites," and seems to us to fix clearly the horizon of the Rilly Limestone. The same class of evidence is obtainable at other spots in the neighbourhood, and, bearing in mind the relationships to and intervention of the marine sands beneath them, it is difficult to see on what grounds the Rilly Marl and Limestone can be placed at the base

* De Mercey, *Bull. Soc. Géol. Fr.*, 3e. sér., t. viii. (1880), p. 26.

† For details of this section, see Gosselet, *Bull. Serv. Carte Géol. France*, Paris (No. 8, January, 1890), p. 7.

‡ G. Dollfus, *Ann. Soc. Géol. du Nord*, t. iii. (1875), p. 159; also Hébert, *id.* (1874).

of the Tertiary series—a position to which the late Prof. Hèbert assigned them. We are inclined to agree with Prof. Prestwich,* M. Watelet,† and others, that the Rilly Beds should be placed at the base of the Lignites and Mottled Clays. This raises a question as to the age of the Marls of Meudon (p. 5).

Near Sézanne, what is generally regarded as the Rilly Limestone, contains an abundant flora described by M. de Saporta.‡ Above the Chalk comes a sandy unstratified bed, on which rests a travertine about sixteen feet in thickness, and here it is that the fossil plants were found. From the general appearance of the deposit and its included remains, French geologists regard the Sézanne limestone as the site of an ancient cascade which was surrounded by large trees. Some of the characteristic plants found are alluded to in the palæontological section (see p. 62).

6. PLASTIC CLAY.

THIS formation, which does not differ in its essential characteristics from our Reading plastic clay, is of very variable thickness in the Paris Basin, being only a few feet in some parts, but as much as 162 feet below St. Denis. M. Ch. d'Orbigny has shown § that it commences with the Conglomerate of Meudon, formed of three beds:—

1. Grey clay with plant remains.
2. Laminated clay with gypsum, lignite and fresh-water shells—*Unio antiquus*, *Physa Heberti*, *Viviparus suessioniensis*.
3. Rolled fragments of chalk, and pisolitic limestone, with *Viviparus*, *Diplocynodon depressifrons*, *Gastornis parisiensis*, *Coryphodon anthracoides*.

Above this, omitting unimportant local deposits, comes the true Plastic Clay, which is divided into two main parts, the *glaises* and the *fausses glaises*; these beds are separated by a stratum of fine clayey and lignitiferous quartzose sand, about seven feet in thickness, with pyritous concretions. M. de Lapparent says || that this sandy bed becomes of more and more importance as it goes towards the Soissonnais, where the Plastic Clay in its turn is not well developed. These sands are about thirty-two feet in thickness in the forest of Compiègne. In ascending order we then have a striped clay with *Ostrea bellovacensis*, and sometimes a fresh-water limestone. The Plastic Clay is largely worked for tiles, and other building purposes.

* Prestwich, *Bull. Soc. Géol. Fr.*, 2 e. sér., t. x. (1853), p. 300; also *Quart. Journ. Geol. Soc.*, vol. xlv. (1888), p. 99.

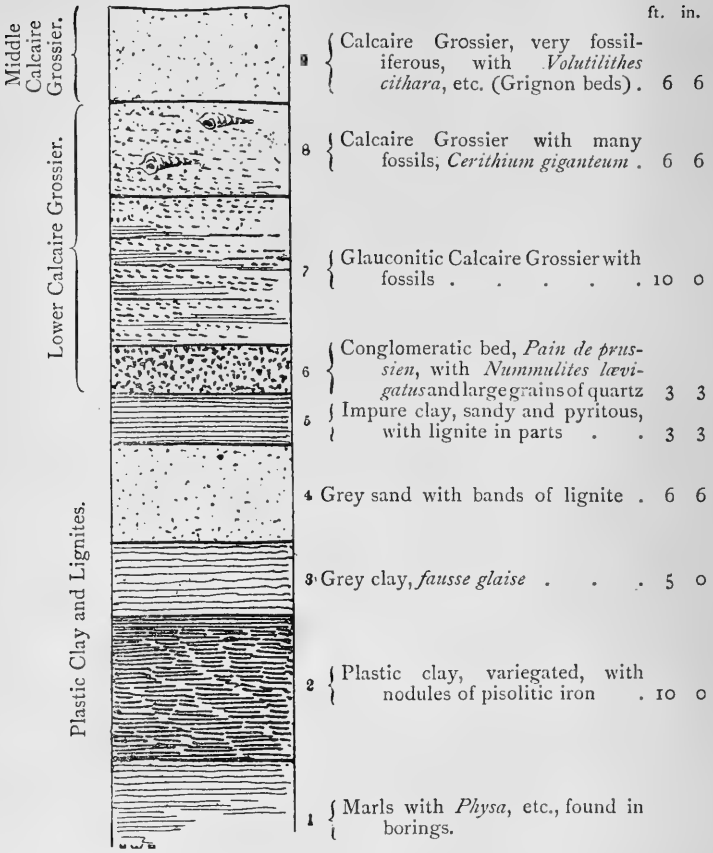
† Watelet, *Mém. Soc. Malac. Belg.*, t. x. (1875), p. 113.

‡ Saporta, *Mém. Soc. Géol. Fr.*, 2 e. sér., t. viii. (1851).

§ Ch. d'Orbigny, *Bull. Soc. Géol. Fr.*, 1 e. sér., t. vii. (1835), p. 281.

|| De Lapparent, *Tr. de Géol.*, 2 ed. (1885), p. 1130.

FIG. 3.—General Section at Issy (Paris).



From Dr. Hovelacque's Notes.

7. LIGNITES OF THE SOISSONNAIS.

ABOUT this horizon several local deposits are found which are difficult to correlate with each other, but which generally are lignitiferous or black clays of varying composition. According to their development they have received numerous names; but as these have only a local value, we prefer to describe the whole in general terms. The lignitic characters are best marked in the northern portion of the basin, and the beds are sometimes known as the Lignites of the Soissonnais. Perhaps the best known section is at Sarron, near Pont-St.-Maxence. At the time of our

visit there last year, we found the pit half-filled with water, but the strata were sufficiently exposed to give us a typical representation of the unctuous black or blue-black clay with fossils. Of the latter, amongst others, we brought away *Corbicula cuneiformis*, *Melania inquinata*, *Neritina globulus*, *N. consobrina*, *Potamidés funatus*, *P. turbinoides* and *Tritonidea lata*.

The Lignites, which are never more than thirteen feet in thickness, are here and there worked for copperas and alum. A lacustrine marly and bituminous limestone is sometimes found in the upper part of the formation; along this horizon also, at Molinchart, we get a sandstone quite fifty-eight feet in thickness. The Belleu Sandstone, near Soissons, celebrated for its plant remains, is probably of the same age. The flora has been described by M. Watelet,* and others, and includes *Cinnamomum formosum*, *Salix axonensis* and *Ficus*.

Near Rheims the "Conglomerate of Cernay," from eighteen inches to twenty-three feet in thickness, and the "Marl of Cernay," from three feet to thirty-two feet in thickness, have been rendered famous by the extremely interesting and well-known mammalian fauna, described by M. Lemoine. The Marl is also found at Mont de Brimont, Rilly, Mont de Berru, Vandeuil and other localities. Above it come thirty-six feet of lignites and clays with pebbles, in which the fauna is practically the same as that at Sarron already alluded to.

The Lignites and associated clays are also well developed near Épernay. In the vicinity of Montreau the Plastic Clay is employed in the manufacture of porcelain; and in that district also is found the "Conglomerate of Nemours."

8. SANDS OF SINCENY.

THESE sands, as the name implies, are typically developed at Sinceny, near Chauny, on the left bank of the Oise. In early days they attracted the attention of MM. d'Archiac †, Hèbert ‡, and Lambert §. More recently the precise relationships subsisting between them and the beds above and below have been very carefully worked out by MM. De Mercey || and G. Dollfus ¶. The sands of Sinceny clearly form a transition between the Lignites and the Nummulitic sands of the Soissonnais. The principal section, near Sinceny, is thus given by the last mentioned authority.

* Watelet, *Desc. des plantes foss. du Bas. de Paris*, Paris, 1866.

† D'Archiac, *Desc. Géol. du Dépt. de l'Aisne*, p. 165.

‡ Hèbert, *Bull. Soc. Géol. Fr.*, 2e. sér., t. xi. (1854), p. 655; and 2e. sér., t. xviii. (1860), p. 77.

§ Lambert, *Étud. Géol. sur le Terr. Tert. au nord de Paris, Soissons, Laon* (1858).

|| De Mercey, *Bull. Soc. Géol. Fr.*, 3e. sér., t. vi. (1878), p. 200; vii. (1879), p. 579.

¶ Dollfus, "Les Sables de Sinceny." *Ann. Soc. Géol. du Nord*, t. v. (1877), p. 5.

Section at Sinceny.

9. Vegetable earth.
8. Massive beds of *Ostrea bellovacensis* and *O. sparnacensis*.
7. Coarse sand in irregular beds, oblique, with rolled black pebbles, fossiliferous.
6. Grey plastic clay.
5. Lignitic clay, stratified with iron pyrites and gypsum.
4. Brownish clay.
3. Bed of black rolled pebbles.
2. Calcareous white and green clay, white or grey sands in pockets, and white, magnesian rounded nodules very abundant, irregularly distributed, sometimes forming the entire mass of the deposit.
1. Fine white sand, slightly glauconitic, base not visible.

Of these, 1 is a member of the lower glauconitic sands ; 2 has much analogy with the marls and limestones of Rilly ; 3 is a pebble bed at the base of the Lignites ; 4, 5 and 6 are the Lignites of the Soissonais ; whilst 7 is the typical fossiliferous horizon of Sinceny, and 8 a local oyster bed of the same deposit. The precise position of these beds with reference to the formation above them is easily determined, as the "*Sables de Cuise*" crop out close by, near the village.

The sands of Sinceny contain nearly all the fluvio-marine species of the Lignites, such as *Potamides funatus*, *Neritina globulus*, *Planorbis hemistoma*, *Melania inquinata*, *Axinæa terebratularis*, *Corbicula cuneiformis* and *C. tellinella*. A few species are peculiar to the deposit and some pass into the "*Sables de Cuise*."

Sands of the same age are also met with at many points in the vicinity of Compiègne, Abbecourt, Brasles, &c.

9. SANDS OF THE SOISSONNAIS.

THE nummularitic Sands of the Soissonais, so called from their maximum and typical development in the neighbourhood of Soissons, rest on the Lignites of Soissons, or in certain localities on the Sands of Sinceny, and they are overlaid by the Calcaire Grossier.

Geographically the beds of this formation are confined to the north-east of the Paris basin ; they disappear before attaining Rheims and Épernay, and, as a rule, do not reach as far south as the Seine ; they are bounded on the west by a line near Gisors and stretch thence in a north-easterly direction towards Laon.

In the valley of the Aisne these beds attain a thickness of over 160 feet ; they are usually composed of fine yellow or brown sands with green grains (usually referred to as glauconite) in the lower beds, but in the middle portions they become more lignitiferous and argillaceous.

Two horizons have been recognised in these sands, viz.,*

Upper : *Sables de Cuise*.

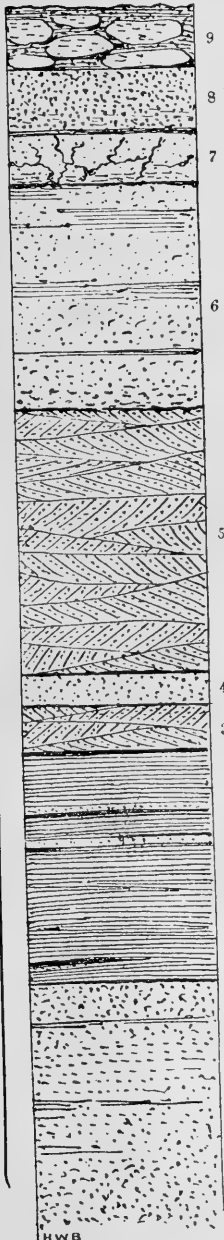
Lower : *Sables d'Aizy*.

* See Appendix II.

FIG. 4.—Section at *Cuisse-la-Motte*.

ft. in.

Lower
Calcaire
Grossier.



Sables de
Cuisse.

- 9 { Argillaceous vegetable earth with blocks of nummulitic limestone (*Pierre à liards*) Lower Calcaire Grossier 3ft. to 4 0
- 8 Dark-green glauconitic sand 4 0
Passage.
- 7 { Orange-coloured clayey sand, glauconitic, with gypseous threads irregularly dispersed 3 6
- 6 { Brown to yellow compact sand, with glauconitic grains, unfossiliferous, or nearly so 14 6
- 5 { Cross stratified, brownish sands, full of fossils, with small lenticular patches of grey unfossiliferous sand 17 0
- 4 { Yellowish grey, fine sand, without fossils 2 0
- 3 { Cross stratified, brown, fossiliferous sands 3 0
- 2 { Stratified yellowish brown sandy clay, with greenish grey mottled sandy bands, compact, iron stained in part, thin (3-inch) shell bed, full of *Turritella* near the centre; few fossils 15 0
- 1 { Grey stratified coarse sands, with glauconitic grains; practically unfossiliferous. Base not seen; but the section is 15 feet deeper in places; obscured by talus 15 0

HWB

The LOWER HORIZON of Aizy is especially characterised by the finer sands above mentioned containing *Rostellaria Geoffroyi*, *Fastigiella gibbosula*, *Ampullina splendida* and other molluscan remains.

The UPPER HORIZON of Cuise is typically developed at Cuise-la-Motte, and there forms an extensive series of coarse sands, even-bedded in the lower and upper parts of the section, and cross-stratified in the central portion. The false bedding, the lenticular patches of sand, and the condition and species of many of the fossils, indicate here, as elsewhere, that the deposits of this formation had a more or less littoral origin.

The section given (fig. 4) shows the condition of the beds when we measured them in July, 1890. A section from Dr. Maurice Hovelacque's notes reveals some minor differences, indicating that the beds are more or less lenticular. The section last referred to was measured in 1883.

The junction with the nummulitic limestone (*pierre à liards*) of the Calcaire Grossier is well shown. The upper beds are often argillaceous and glauconitic, and are important from an economic point of view, forming a water-bearing bed.

At Hérouval (Oise) the fine sands of the upper Cuise horizon contain a very rich fauna, many species being peculiar to that locality, e.g., *Bayania herouvalensis*, and others, though not restricted to this district, are more plentiful, e.g., *Cyrena tetragona*. In 1889 we saw the following section:—

Section at Hérouval.

| | | ft. in. | ft. in. |
|---|---|---|--------------|
| Drift (?) and vegetable mould | | 3 0 to | 4 0 |
| Lower Calcaire Grossier | | | 3 0 |
| Glauconitic bed with fish teeth | | | 0 4 |
| <i>Sables de Cuise.</i> | { | Buff coloured marl; pockets of shells | 3 0 |
| | | Fine sand, very pure, full of shells | 4 0 exposed. |
| Base not seen. | | | |

At Liancourt St. Pierre, near Chars, in a very fine white sand, many fine species were collected from a small exposure below the bed of *débris* with shark's teeth, which we shall refer to as constituting the basal portion of the Calcaire Grossier in certain localities. The section measured by us in 1889 was as follows:—

Section at Liancourt.

| | | ft. in. | ft. in. |
|--|---|--|--------------|
| Vegetable mould. | | | |
| Lower Calc. Gross. } | { | Marl. Fossiliferous | 9 0 to 10 0 |
| | | Passage Beds, Sand. Very coarse grained and glauconitic, full of comminuted shells, teeth of <i>Otodus</i> , &c. } | 5 0 to 6 0 |
| Lower Calc. Gross. to Sab. de Cuise. } | { | Sand. Glauconitic, with few, if any, fossils. | 8 6 to 13 6 |
| | | Sables de Cuise. Sand. Pale purple, full of small shells | 1 6 |
| | { | Sand. Glauconitic | 5 0 exposed. |
| Base not seen. | | | |

This section is the downward extension of the Calcaire Grossier seen at Le Vivray, the coarse-grained glauconitic bed being exposed at the base of that section.

At various levels in the sands of the Soissonnais concretions of a peculiar character are met with, and, from their striking resemblance to the head of a cat, are known as *têtes de chat*. They are masses of tubercular calcareous sandstone or dolomitic limestone, occasionally siliceous. The fossils of these sands are almost innumerable; but we may mention a few of the most distinctive forms. The Foraminifera are especially abundant, *Nummulites planulatus* being met with in millions. Among the Mollusca, the following are characteristic and plentiful:—*Melanopsis Parkinsoni*, *Nerita tricarinata*, *Velates Schmideli*, *V. equinus*, *Diastoma variculosum*, *Brachytrema breviculum*, *Potamidés subacutus*, *P. papalis*, *Homalaxis laudunensis* and *Corbicula Gravesi*. The Vertebrata are represented by over thirty species of fishes, according to Graves* and Paul Gervais.† A long list of plants is given by Watelet‡ as composing the flora of the sands of the Soissonnais.

10. CALCAIRE GROSSIER.

THE Calcaire Grossier is a thick mass of more or less calcareous beds, usually coarse in texture, varying from a calcareous sand to a hard, compact limestone, sometimes dolomitic and siliceous. The limits of this series of beds in the Paris basin have been well described by M. G. Dollfus.§ The Lower or Marine Calcaire Grossier has a more extended range northwards than the Fluvio-Marine or Upper Calcaire Grossier. The former beds stretch from Courtagnon and Damery on the east, and sweep round by Montnirail to the south of Paris, by Villeneuve St. Georges, Palaiseau, and Houdan. Towards Evreux and Dreux the boundary is not very distinct, several tongues projecting from the main mass. On the north and north-west again, no definite boundary can be drawn, but the isolated patches over those parts of the basin are traceable, with more or less certainty, into Belgium, and are represented in England by rocks of similar age.

The Fluvio-Marine type of the Calcaire Grossier is much more restricted in extent, being unknown outside the limits of the Paris basin. The former existence of two great lakes has been indicated by M. G. Dollfus.|| One of them stretched from the north of Épernay to Montereau (a distance of at least seventy-five miles), bounded

* Graves, *Essai sur la Topographie Géol. de l'Oise*, p. 586.

† Gervais, *Zool. et Paléont. françaises*.

‡ Watelet, *Desc. des plantes foss. du Bass. de Paris* (1866), p. 255.

§ Dollfus, *Essai sur l'extension des Terr. Tert.*, etc., in *Mém. de la Soc. Géol. de Normandie*. Havre (1880), p. 591.

|| Dollfus, *op. cit.*, p. 9, and map.

partly by the Seine on the south, and varying from fifteen or sixteen miles wide at Provins to a mere point north of Épernay. The other lake was situated to the south-east of Chartres, and was, roughly speaking, forty miles long from north-east to south-west, and fifteen to twenty miles across in a south-easterly direction. That the Upper Calcaire Grossier had a more considerable range is, however, shown by the outliers in various parts of the Paris basin.

Throughout this extensive tract the marine beds vary from 35 feet to 146 feet thick, and in almost every part contain an exceedingly rich and interesting fossil fauna, to which reference will be made in dealing with the details of the formation.

This formation is the most important in the Paris basin, not only from its interest in a geological and palæontological sense, but also on account of its great commercial value, as from it most of the important building stones of the French metropolis are obtained.

The component beds of this formation are usually yellow or buff in colour, passing by insensible gradations to a white, calcareous mass. Speaking generally, where the colour is of a yellow or brownish tint sandy particles predominate, while the whiter portions are almost wholly calcareous, either compacted or in a pulverulent condition; in any case but few extraneous minerals, other than siliceous and carbonate of lime in an amorphous state, are present in the Calcaire Grossier, occasional crystals of carbonate of lime and quartz and flakes of mica being the somewhat rare exceptions. The Upper Calcaire Grossier (the Caillasses) is of a more varied character than the Lower and Middle, as we shall presently see.

The lithological characters of the Calcaire Grossier, being fairly constant for a particular horizon throughout the basin, afford a suitable means of identifying the various levels. The Lower beds are generally very coarse-grained, sandy, and calcareous, compacted in places into a soft conglomerate, with green and black flints and grains of a mineral generally referred to glauconite. The Middle zone is usually composed of fine-bedded soft limestones, or loose calcareous sands; but in certain districts, as at Chantilly, the limestone is consolidated, and forms an excellent freestone for building purposes, from which very large blocks are obtainable.

The Upper division is often of a complex character, with thin bedded limestones, beds of clay, calcareous or siliceous sands, or thin layers of horny flint and thin marls, many times repeated in a single section, as at Vaugirard and elsewhere. This portion of the Calcaire Grossier is without the practical value of the lower beds, but it is of particular interest to the geologist from its chemical and mineralogical complexity. Quartz is found in some cases, as at Neuilly, with the angles developed in bi-pyramidal form

in detached crystals of considerable size. Fluor-spar, or "*spath-fluor*," is also found in veins, in small cubes, perfectly distinct, and of a pure fawn-colour.* Translucent gypsum or alabaster is also well developed in some districts.

In addition to the lithological characters, fossil zones have been to some extent defined as indicating certain horizons; but it has been noticed in many cases that the characteristic fossil is absent, although the physical characters are clear, or that the particular species selected as the zone fossil passes into another bed. Thus *Nummulites lævigatus* is very abundant in the Lower Calcaire Grossier, but it does not always exist in the lower beds, and is again met with in the Middle Calcaire Grossier; while *Orbitolites complanatus*, so plentiful in the last mentioned horizon, passes into the Upper.†

It is advisable, therefore, not to insist too strongly upon the value of distinctive fossils as indicating definite horizons when taken alone, but when they are considered in conjunction with the lithological characters the relation of the various beds in the Paris basin can be readily and accurately determined.

In common with all series of rocks the Calcaire Grossier has been divided into groups in different ways by various authors. Here we are only concerned with the most generally accepted and latest divisions and sub-divisions employed.

The classification adopted by M. Michelot‡ is followed by many authors, and is appended; four horizons are recognised in his tabulation.

Classification of the Calcaire Grossier (after Michelot).

| | Caillasses without shells (marl of | ft. in. | ft. in. |
|---|---|---------|---------|
| Caillasses of the Calcaire Grossier. | Nanterre | 1 10 to | 19 6 |
| | Caillasses with shells (Rochette) | 1 7 to | 6 6 |
| Upper Calcaire Grossier, with <i>Cerithium</i> . | Roche (de Paris) | 0 9 to | 3 3 |
| | Bancs-francs (de Paris) | 3 3 to | 13 0 |
| | Clicquart (<i>roches-du-haut</i> of the Aisne) | 2 0 to | 13 0 |
| | Banc Vert (and accessory beds) | 3 3 to | 19 6 |
| | Saint Nom (<i>roches-du-bas</i> of the Aisne) | 1 7 to | 3 3 |
| Middle Calcaire Grossier, with <i>Miliola</i> . | Banc Royal | 1 0 to | 8 0 |
| | Vergelés (Lambourdes) | 3 3 to | 32 6 |
| Lower Calcaire Grossier, with <i>Nummulites</i> . | Bancs à Verrains (<i>Cerithium giganteum</i>) | 2 0 to | 19 6 |
| | Saint Leu (Roche des Forgets) | 6 6 to | 32 6 |
| | Bancs à <i>Nummulites</i> (<i>N. lævigatus</i>) | 3 3 to | 39 0 |

The classification subsequently proposed by M. G. Dollfus§ was more detailed, and it remains the most complete yet published. In this classification the Caillasses are included in the Upper Calcaire Grossier, the latter being sub-divided into three groups.

* Stanislas Meunier, *Géol. des Env. de Paris*. Paris (1875), p. 196.

† G. Dollfus, *Bull. Soc. Géol. Fr.*, 3e. sér., vol. vi. (1878), p. 261.

‡ Michelot, *Bull. Soc. Géol. Fr.*, 2e. sér., vol. xii. (1855), p. 1345.

§ Dollfus, *Coupe Géol. de Chem. de Fer de Méry-sur-Oise*; *Bull. Soc. Géol. Fr.*, 3e. sér., vol. vi. (1878), p. 271.

Classification of the Calcaire Grossier (after Dollfus).

| | | | |
|---|--|--|--|
| | | Siliceous limestone and variegated marls. | |
| Caillasses or Upper Calcaire Grossier. | Upper Sub-Group, with <i>Cardium obliquum</i> and <i>Cerithium denticulatum</i> . | Limestone with <i>Cardium obliquum</i> and <i>Cerithium Blainvillei</i> . | |
| | | Siliceous limestone and marl. | |
| | | Limestone with <i>Cerithium denticulatum</i> and <i>Potamides cristatus</i> . Marl without fossils. | |
| | | Siliceous limestone with <i>Potamides</i> . | |
| | | Siliceous limestone and marls alternating, without fossils. | |
| | Middle Sub-Group, with <i>Lucina saxorum</i> & <i>Corbula anatina</i> . | Lower Sub-Group, with <i>Potamides lapidum</i> and <i>Miliola</i> . | Limestone with corals (<i>Stylocænia</i>). |
| | | | Siliceous limestone (5 ft.) with parting of laminated marl (2 in.). |
| | | | Limestone in thin layers with <i>Corbula</i> (Rochette). |
| | Middle Calcaire Grossier. | Lower Calcaire Grossier. | Limestone with <i>Miliola</i> and <i>Lucina saxorum</i> (Roche). |
| | | | Siliceous limestone with fossils (Bancs francs). |
| | Lower Calcaire Grossier. | Middle Calcaire Grossier. | Limestone (dolomitic) (Clicquart) with <i>Miliola</i> . Green marl. |
| | | | Siliceous limestone in two beds. } (Banc Vert.) Green marl. |
| | Lower Calcaire Grossier. | Middle Calcaire Grossier. | Limestone with <i>Miliola</i> (dolomitic) (Saint-Nom). |
| | | | Siliceous limestone with <i>Potamides</i> ; accessory rocks. |
| | Lower Calcaire Grossier. | Middle Calcaire Grossier. | Tabulated limestone with distinctive fossils. |
| Limestone with <i>Orbitolites</i> and varied fossils. | | | |
| Lower Calcaire Grossier. | Middle Calcaire Grossier. | Limestone with <i>Fabularia</i> and vegetable <i>débris</i> . | |
| | | Mass of limestone with <i>Miliola</i> , <i>Turritella</i> , and varied fossils. | |
| Lower Calcaire Grossier. | Middle Calcaire Grossier. | Limestone with <i>Miliola</i> and <i>Terebratula</i> . | |
| | | Glaucanitic Calcaire Grossier with <i>Cerithium giganteum</i> (Banc à Verrains). | |
| Lower Calcaire Grossier. | Middle Calcaire Grossier. | Glaucanitic sand, calcareous, with <i>Lenita patellaris</i> . | |
| | | Glaucanitic sandy Calcaire Grossier with <i>Cardium porulosum</i> (Pierre de Saint-Leu). | |
| Lower Calcaire Grossier. | Middle Calcaire Grossier. | Glaucanitic sandy Calcaire Grossier with <i>Nummulites lævigatus</i> . | |
| | | Glaucanitic sand, sometimes calcareous and indurated, with pebbles of green quartz. | |
| | | Sharks' teeth, rolled <i>débris</i> of corals, etc. | |

Elsewhere* the same author has shown that the Calcaire Grossier is divisible into two types.

2. Fluvio-marine or Neptodunian. Type at Nanterre.
1. Marine. { Middle. Parnian. Type at Parnes.
 { Lower. Calvimontian. Type at Chaumont.

The more detailed classification is preferable for a complete study of the formation.

Our attention may now be directed to an investigation of the characters of the many sub-divisions of the Calcaire Grossier; and we must point out that some of the component beds have received distinctive names, mostly derived from the quarrymen's terms, and therefore difficult or impossible to render in English. Our own quarries furnish us with parallel instances, for example, the "Bacon Tier," "Aish," and "Roach," of the Portland quarries.

* Dollfus, *Mém. de la Soc. Géol. de Normandie*. Havre (1880), pp. 591, 592.

LOWER CALCAIRE GROSSIER.—The Lower Calcaire Grossier rests, when in its original position, on the glauconitic sands of the Soissonais, and in its lowest beds is scarcely distinguishable from it—except that a bed with quartz pebbles, shark's teeth, and *Eupsammia trochiformis* separates it from the underlying *Sables de Cuise* in a clear and constant manner. This bed can be well seen in a good exposure of Lower Calcaire Grossier, at Liancourt St. Pierre, near Gisors, resting on the fine sands already mentioned.* This particular bed has been the cause of much controversy, some regarding it as the uppermost member of the *Sables de Cuise*, and other authorities referring it to the base of the Calcaire Grossier.

In certain districts, as at Abbecourt and Cuise, the transition is less clearly marked, the bed of *débris* is absent and the junction of the two formations is difficult to determine.

Without entering into the merits of the discussion as to which bed actually is to be considered as the dividing one (it is not an important point), it is certain that the bed with *Nummulites lævigatus* is regarded by all as typically one of the lowest beds of the Calcaire Grossier, and its best development is seen in the neighbourhoods of Soissons and Laon—the districts respectively known as the Soissonais and Laonnais.

Near Paris, at Vaugirard and Issy, this bed is represented by a fine sandy deposit, partly calcareous and of a yellow colour, often compacted into a stone (as at Festieux, Mont Ganelon and L'Isle Adam) full of *N. lævigatus* and *N. scaber*, and called *Pierre à liards* † by the workmen, in reference to the presence of the Foraminifera, which are often of considerable size. At and near Cuise this stone is well developed, and can be seen capping the Cuise sands; in some instances the stone is badly decayed and detached *Nummulites* can be collected in prodigious quantities, while very fine sections of the chambers can be obtained by fracturing the hard portions of the limestone. The *Pierre à liards* rests on the bed with *Eupsammia trochiformis* and *Lenita patellaris*.

Characteristic mollusca of this horizon are *Chlamys solea*, *Cardium porulosum* and *Chama calcarata*.

The "*Pierre de Saint-Leu*," is well developed in the neighbourhood of Creil, where it furnishes excellent thick-bedded building stones. At L'Isle Adam, the stone is fine and hard and is distinguished under the name of *Roche des Forgets*. At Pont-Sainte-Maxence the St. Leu stone is capped by a dolomitic bed twenty-six feet to thirty-two feet thick in calcareous sand with carbonate of magnesium.

At Grignon this horizon is represented by a calcareous glauconitic sand, full of Mollusca and Echinoidea. At Liancourt St. Pierre, it is formed of compact beds with *Corbis lamellosa*, *Lucina gigantea*, and other shells.

* *Ante*, p. 12, with Section at Liancourt.

† *liard*=a coin of the value of a farthing.

The fauna of this horizon is exceedingly varied, *Nautilus Lamarcki* and *N. umbilicaris* are not uncommon at Pont-St.-Maxence and Vaugirard, while the fine species above mentioned and *Corbis subpectunculus* are specially characteristic.

The "*Banc à Verrains*." This horizon is generally formed by a very fossiliferous limestone called in the quarries near Paris "*Saint-Jacques*." At Issy, Gentilly, Montrouge and elsewhere it furnishes stone of excellent quality, only slightly inferior to the *Pierre St.-Lew*. The fauna is most prolific and varied, especially where the beds are in a calcareous sand, as at Damery, Fleury-la-Rivière, Chamery, Parnes, Chaussy, Grignon, Chaumont, Courtagnon and elsewhere; the fossils are then perfectly preserved, even retaining colour markings in some instances. This may be particularly noticed with *Volutilithes spinosus*, the shell of which is often marked with orange-coloured bands. Among the typical fossils of this horizon, *Cerithium giganteum* is the most important; the casts of this gastropod are called "*Verrains*," and from their occurrence the bed is named. Other forms are *Turritella imbricata*, *T. sulcifera*, *T. carinifera*, *Volutilithes cithara*, *Mesalia intermedia*, *M. multisulcata*, *Cerithium serratum*, *Axiuua pulvinata*, *Crassatella plumbea*; Cephalopoda as *Belosepia sepioidea*; Echinoidea such as *Echinolampas*, *Breynella*, *Pygorhynchus* and *Hemiaster*.

MIDDLE CALCAIRE GROSSIER (or Calcaire Grossier with *Miliola*). Where most fully developed, the Middle Calcaire Grossier may be sub-divided into the five horizons indicated in the table of classification, forming two groups, the lower called *Vergelès* or *Lambourdes*,† and the central part *Banc Royal*.

The *Vergelès* are yellowish-white limestones often marked with iron veins, and where hard, form good building stones, as at Chantilly, Carrière Saint-Denis and Nanterre; they are very well developed in the department of Oise.

The *Banc Royal* furnishes large and very good building stones, worked among other localities at Méry-sur-Oise, Neuilly, Montrouge and Gentilly.

Taken as a whole the Middle Calcaire Grossier is an accumulation of thin incoherent beds of sandy Calcaire Grossier with freestone beds developed in places, where it receives the distinctive names already described. The Fauna here, as in the Lower Calcaire Grossier, is exceedingly rich and interesting; Vertebrata are represented by *Hemirhynchus Deshayesi* and other species, particularly at Puteaux (Seine); while a rich Flora of marine or brackish water plants, such as *Culmites*, *Phyllites multinervis* and *Equisetum deperditum*, has been described from various localities, as La Glacière, Montsouris, &c. The Mollusca are well represented and well preserved, as at Grignon, Parnes, Mouchy and other rich localities. *Lithocardium aviculare*, *Cerithium*

* *Lambourdes* = soft stone.

lamellosum, *Clavilithes Noë*, *C. deformis*, *Sycum bulbiforme*, *Ancilla Lamarcki*, *Ancilla olivula*, *Marginella crassula* and *Terebellum* of several species may be instanced as examples of the fauna of this rich horizon.

The Foraminifera, especially such forms of *Miliola* as *Biloculina*, *Triloculina* and *Quinqueloculina*, are exceedingly plentiful and give the second name to this middle division—Calcaire Grossier with *Miliola*. The genera are, however, by no means restricted to the *Miliolina*, *Fabularia discolithes* and *Orbitolites complanatus* being especially abundant, very large and well preserved, at the localities already mentioned.

UPPER CALCAIRE GROSSIER (including the "Caillasses"). The upper division of the Calcaire Grossier is composed, as we have already seen of beds of very varied mineralogical characters, with thin-bedded limestones, in part siliceous or dolomitic.

The beds which have received distinctive names are for the sake of clearness repeated here; of these named beds the Marls of Nanterre is the uppermost.

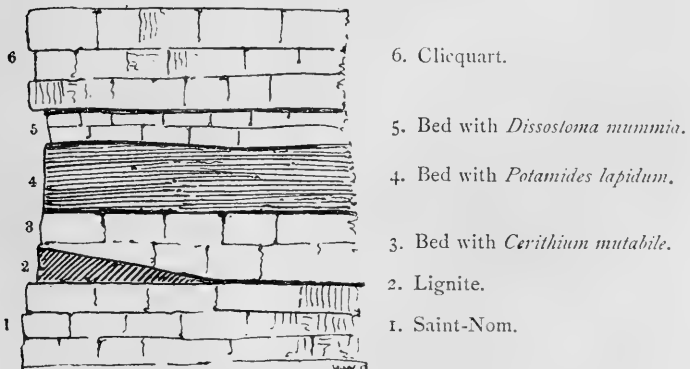
Divisions of the Upper Calcaire Grossier.

| | | | | |
|--|---|--------------------------|---|------------------------------|
| Caillasses or Upper Calcaire Grossier of G. Dollfus. | } | Marls of Nanterre. | } | Caillasses, of many authors. |
| | | Rochette. | | } |
| | | Roche (de Paris). | | |
| | | Bancs francs (de Paris). | | |
| | | Clicquart. | | |
| Banc Vert. | | | | |
| Banc Saint-Nom. | | | | |

The beds above the Marls of Nanterre will be described in due course.

The "Banc Vert" offers one of the most constant horizons in the Paris basin, and the following section after Stanislas Meunier clearly shows the general character of this level.

FIG. 5.—Section of the "Banc Vert."



It will be seen from the above that the Banc Vert proper (No. 4) is underlaid and overlaid by limestones, the lower called Saint-Nom in some districts, or base rock (*roche-du-bas*) in others, as in the Aisne quarries; while in other quarries, as Vaugirard, Bagneux, and elsewhere, it is called "*liais*." The upper limestone is called *cliquart* in many quarries, or top-rock in the Aisne district (*roche-du-haut*), and occasionally "*liais*," as in the St. Denis quarries.*

Both these limestones yield some of the most excellent building materials of the basin, and they are almost exactly similar both lithologically and in the fossils which they contain.

One of the most interesting facts in connexion with the Banc Vert is the introduction of fresh-water beds with characteristic fossils. As we have already indicated, the neighbourhood of Provins has a lake-like expanse of beds, which are well developed in Seine-et-Marne, and are referred to this horizon. *Dissostoma mummia* is a frequent fossil, both in the neighbourhood of Paris and Provins, at this level; while in the more fresh-water strata of the latter district, *Planorbis pseudoammonius*, *P. Chertieri*, *Viviparus novigentiensis*, *V. Orbignyi*, *Limnæa Michelinii* and *Helix Edwardsi* are abundant.

The fauna of the Banc Vert is rich in Vertebrata and Mollusca, while in certain areas, as at Vaugirard, Senlis, and elsewhere, a bed of lignite is found, filled with vegetable impressions and with carbonised wood passing into a true lignite.

In Dr. Hovelacque's notes there are recorded from Issy, Marine Algæ, e.g. *Zostera*, and Terrestrial flora, such as *Nipadites*, *Potamogeton* (?), *Dryandra*, *Flabellaria* and *Pinus parisiensis*. The Vertebrata include such interesting forms as *Lophiodon parisiensis* and *Dichobunus suillus*, which, together with *Pachynolophus*, have been recorded from this horizon at Nanterre and Passy. Fish remains are not uncommon, including *Carcharodon disauris*, *Pristis parisiensis* and *Labrax major*.

The Mollusca, in addition to the fresh-water forms already cited, include the characteristic *Potamides lapidum* with its varieties, *Mesalia fasciata* also of very variable character, and some distinctive Cerithidæ, as *Cerithium Gravesi*, *C. serratum*, *Potamides angulosus*, *P. interruptus*, *P. calcitrapoides*.

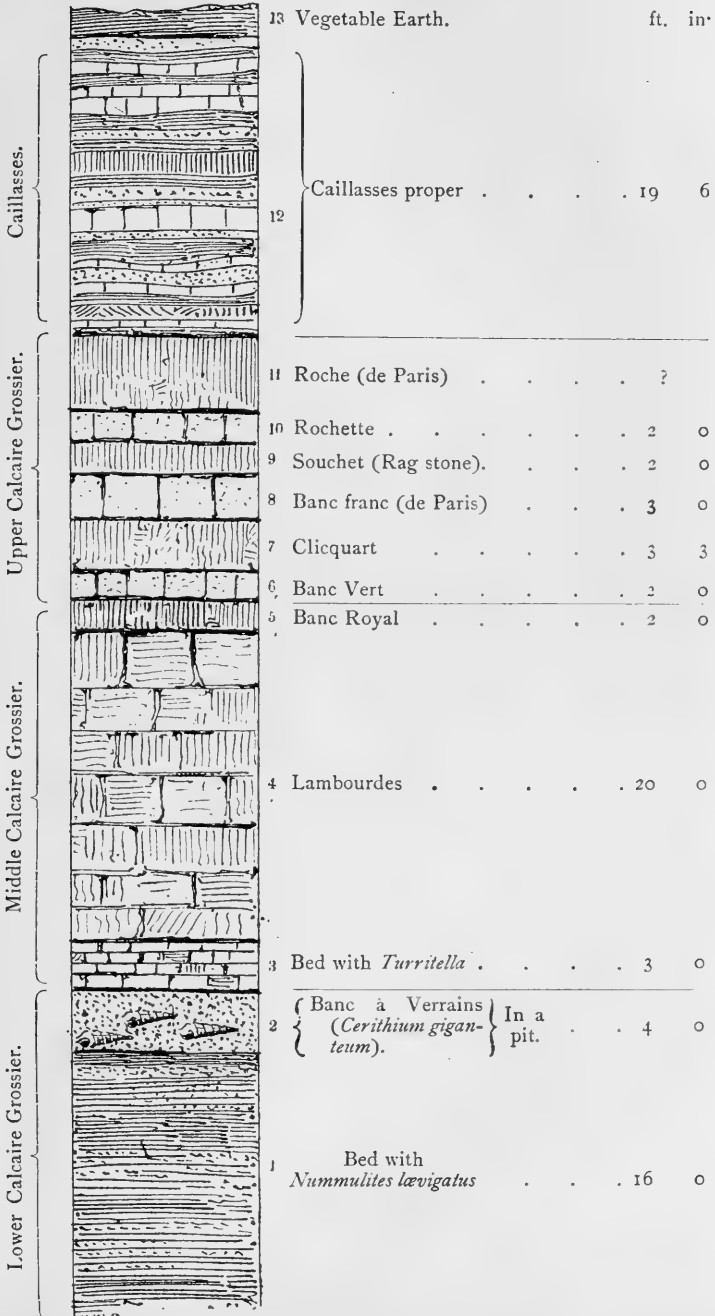
"*Bancs francs*" and "*Roche*" de Paris.—The Bancs francs, with the overlying bed called *Roche de Paris*, are well developed to the south of Paris, as at Gentilly and Arcueil,† and were formerly worked for building material, but the best stone is now exhausted and the quarries are unworked. The series is formed by alternations of marly beds with calcareous sands, in part indurated.

The fauna is characteristic and principally Cerithidæ; such species as *C. denticulatum*, *P. angulosus* and *P. cristatus* are com-

* Stan. Meunier, *Géol de Paris* (1875), p. 181.

† See Section p. 21.

FIG. 6.—Section of *Calcaire Grossier* at Arcueil.
Showing junction of Upper, Middle, and Lower Calcaire Grossier.



From Dr. Hovelacque's Notes.

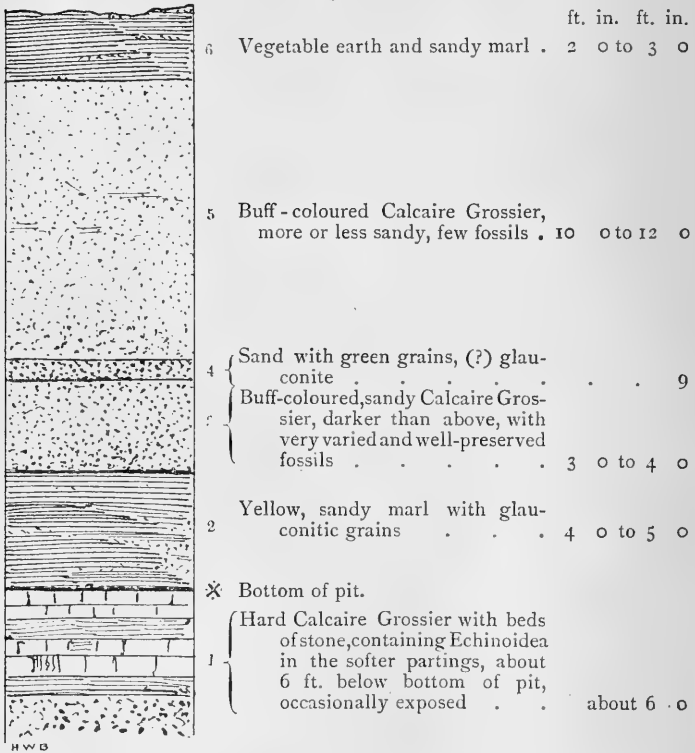
mon, the latter being especially distinctive. The upper parts of the beds also contain *Potamides lapidum* and *Dissostoma mummia*, with *Ampullina parisiensis* and *Lucina saxorum*.

Rochette.—This bed is often formed of a mass of *Corbula anatina*, together with *Anomia tenuistriata*, *Meretrix elegans*, and Cerithidæ, as *P. echinoides*, *P. cristatus* and *P. lapidum*.

Some of the species above enumerated are particularly found in a brown marine marl, called *pain d'épice*,* on account of its colour.

Marls of Nanterre.—This bed, well developed at Nanterre, is regarded as a chemical precipitate, and is used for wood polishing. In other parts of the basin this horizon is characterised by fragmentary, white, calcareous marls, with

FIG. 7.—Section of the Calcaire Grossier at the École d'Agriculture, Grignon.



H.W.B., 1890.

Base not seen.

* Gingerbread.

crystals, in places, of carbonate of lime, rhombohedral or scalenohedral, but the latter rarely. Fossils are not recorded from this level.

Beds above the Marls of Nanterre.—Above the Marls of Nanterre, M. G. Dollfus, in his paper on the Méry Railway,* has established the existence of a thick mass of beds, exceeding thirty feet in thickness, including at least forty separate beds, which are divisible into four fossiliferous and four unfossiliferous horizons; and he has shown that these immediately underlie the lowest beds of the Sables Moyens. The fauna is also more allied to that of the Sables Moyens, since *Potamides pleurotomoides*, *P. Bonellii* and *Cerithium denticulatum* occur among other fairly characteristic forms.

11. SABLES MOYENS

(SABLES DE BEAUCHAMP.)

IMMEDIATELY upon the Caillasses of the Calcaire Grossier is a mass of sands, sandstones and marls, varying from thirty-two feet to forty-nine feet in thickness and of considerable extent in the Paris basin. Towards the east they extend nearly to Épernay, they touch Verneuil (Marne), sweep round under Brie, pass close to Paris (where they are in a rudimentary state), border the Seine, extend to the Vexin, and are represented in the north-west of the basin by several outliers.†

Although not possessing the same commercial value as the Calcaire Grossier, and, partly for that reason, not having been so minutely sub-divided, the palæontological and geological interest attaching to the Sables Moyens is very considerable. The fauna is rich and varied, and affords many points of resemblance with those of beds of similar age, though not of similar lithological composition, on the English side of the Channel.

The beds constituting this formation are divided into three stages, or horizons, as follows:—

| | |
|--------------|---------------------------|
| Upper . . . | Horizon of Mortefontaine. |
| Middle . . . | „ Beauchamp. |
| Lower . . . | „ Auvers. |

Or, taking the types from the districts where each horizon is best developed, M. G. Dollfus ‡ classes the levels as—

| | | |
|----------------------|----------------|------------------------|
| Morfontian . . . | (Upper) . . . | Type at Mortefontaine. |
| Ermenonvillian . . . | (Middle) . . . | Type at Ermenonville. |
| Auversian . . . | (Lower) . . . | Type at Auvers (Oise). |

In any case a triple division is admitted, and the three horizons are thus described by M. Goubert.§

* Dollfus, *Bull. Soc. Géol. Fr.*, 3e. sér., vol. vi. (1873), p. 275.

† G. Dollfus, *Mém. Soc. Géol. de Normandie*, Havre (1880), p. 593.

‡ Dollfus, *Mém. Soc. Géol. de Normandie*, Havre (1880), p. 592.

§ Goubert, *Bull. Soc. Géol. Fr.*, 2e. sér., t. xvii. (1860), p. 141.

Sub-divisions of the Sables Moyens.

| | | | | |
|--------|---|---|---|--|
| Upper | { | Fine or argillaceous sands, or marly limestone with— <i>Tritonidea polygona</i> , <i>Potamides Cordieri</i> , <i>P. pleurotomoides</i> , <i>P. tricarinatus</i> , <i>Avicula fragilis</i> and <i>Corbula angulata</i> . | { | La Chapelle-en-Serval and Mortefontaine. |
| Middle | { | Sand with <i>Bayania hordacea</i> , of Beauchamp, Le Guépelle, &c., replaced by stone at Lizy, Louvres, Mary, Étrepilly, &c., with <i>Potamides Bouei</i> , <i>P. scalaroides</i> , <i>Meretrix elegans</i> , <i>Portunus Hericarti</i> , &c. | | |
| Lower | { | Sands of Ezanville, of Moiselles, and "curvilinear" sandstone of Beauchamp with <i>Corbicula deperdita</i> , <i>Cerithium mutabile</i> and <i>C. tuberculosum</i> . | | |
| | { | Sand with broken fossils and pebbles, <i>Nummulites variolarius</i> , Corals, &c.; Auvers, Acy-en Multien. | | |

LOWER SABLES MOYENS (Horizon of Auvers).—The lower portion of the Sables Moyens may be divided into three levels.

The lowermost consists of a bed of *débris* of the Calcaire Grossier; it contains shells, usually broken and rolled, of species belonging to the Calcaire Grossier, such as *Clavilithes deformis* and *Venericardia planicosta*. With the rolled and derived fossils are associated much-worn pebbles of Calcaire Grossier, often pierced by lithodomous Mollusca. Several species of *Ostrea*, as *O. dorsata*, *O. gryphina*, are abundant at this level, which was well exposed in the Railway cutting near Méry-sur-Oise ("Tranchée de M. Lamoignon"), and its contact with the underlying Upper Calcaire Grossier clearly shown.*

Above this horizon the Sables Moyens are often consolidated, forming a thick, pure sandstone without fossils. This bed is very well shown in the section at Auvers (fig. 8), where the stone in the lower part, at least twenty feet in thickness, is quarried for road metal and paving-sets.

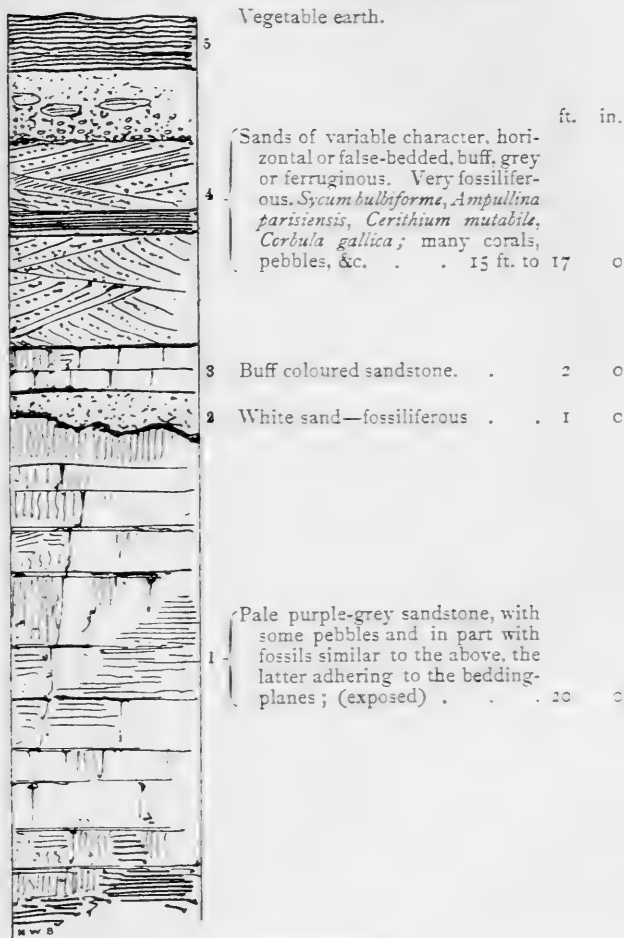
This classical section was figured by A. d'Orbigny in 1852, † and at that time the sandstone was only exposed to the depth of nearly seven feet. Prof. Prestwich described the section ‡ in 1857, and the sandstone was then as fully exposed as at the time of our visit (1889). The upper part of the Lower Sables Moyens is also well shown at Auvers; and we here see that the component beds are variable in their characters, sands predominating, often calcareous, sometimes false-bedded, and occasionally consolidated into thin bands of sandstone. A yellow calcareous sand in the upper part of the section is full of fossils, the most noticeable being *Nummulites variolarius*. The Mollusca are also exceedingly numerous; the following may be particularly mentioned in addition to those indicated in the explanation of fig. 8:—*Venericardia*

* G. Dollfus, *Bull. Soc. Géol. Fr.*, 3^e sér., t. vi. (1878), p. 256.

† D'Orbigny, *Cours. Elém. de Pal. et Géol.*, Paris (1852), p. 748, Fig. 577.

‡ Prestwich, *Quart. Journ. Geol. Soc.*, vol. xiii. (1857), p. 110.

FIG. 8.—General Section at Auvers.
(Lower Sables Moyens: Horizon of Auvers.)



sulcata, *Meretrix elegans*, *Bayania hordacea*, *Cerithium mixtum* and *Olivella Branderi*; corals, such as *Madrepora Solanderi*, *Lobopsammia cariosa* and *Litharæa Deshayesi*, are also very abundant.

MIDDLE SABLES MOYENS (Horizon of Beauchamp).—The middle portion of the Sables Moyens is divided into two series, as before indicated—the lower of sand and sandstone, the upper chiefly

calcareous. The sands (*Sables de Beauchamp*) are extraordinarily fossiliferous, amongst other places, at Le Guépelle, Beauchamp and Verneuil; considerably more than two hundred species have been recorded from the last-named locality alone. The sandstone (*Grès de Beauchamp*) is quarried in many places for pavings. At Lizy-sur-Ourcq a siliceo-calcareous freestone (*Pierre de Lizy*) is worked from this horizon. †

The classical section for this horizon is no longer visible; but the details are given in the paper just referred to. To the east of Herblay, close to Paris in the wood of Boissy, other sections have since been exposed.

The following is a general section of the beds in this neighbourhood, from Dr. Hovelacque's notes:—

General Section at Beauchamp.

| | | |
|---|-----|-----|
| 9. Marly limestone, white, more or less <i>remanié</i> (St. Ouen limestone) with small <i>Bithinia</i> | ft. | in. |
| | 10 | 0 |
| 8. Bed with <i>Avicula Defrancei</i> | | ? |
| 7. Brownish marls with flint in "plaquettes," and <i>Ampullina</i> (Ducy limestone) | 2 | 0 |
| 6. Hard lithographic limestone, small <i>Bithinia</i> | 1 | 3 |
| 5. Yellow marls | 1 | 3 |
| 4. White sands with <i>Bayania hordacea</i> | | 9 |
| 3. Brown sandstone | | ? |
| 2. Brown sands | 3 | 3 |
| 1. White sands, pure, very fossiliferous, containing <i>Bayania hordacea</i> , <i>Potamides Bouei</i> , <i>P. deperditus</i> , <i>Meretrix elegans</i> and <i>Corbicula deperdita</i> | | |

One of the best sections now open in this horizon is that on the road to Ermenonville, near Ver, and the section is named from the latter town (fig. 9, p. 27).

A few other characteristic fossils of the true marine beds of the horizon of Beauchamp are *Potamides scalaroides*, *P. Bonnardi*, *Cerithium crenatulum*, *Cancellaria evulsa*, *Melongena subcarinata*, *Xenophora agglutinans*, *Arca biangula* and *Meretrix levigata*.

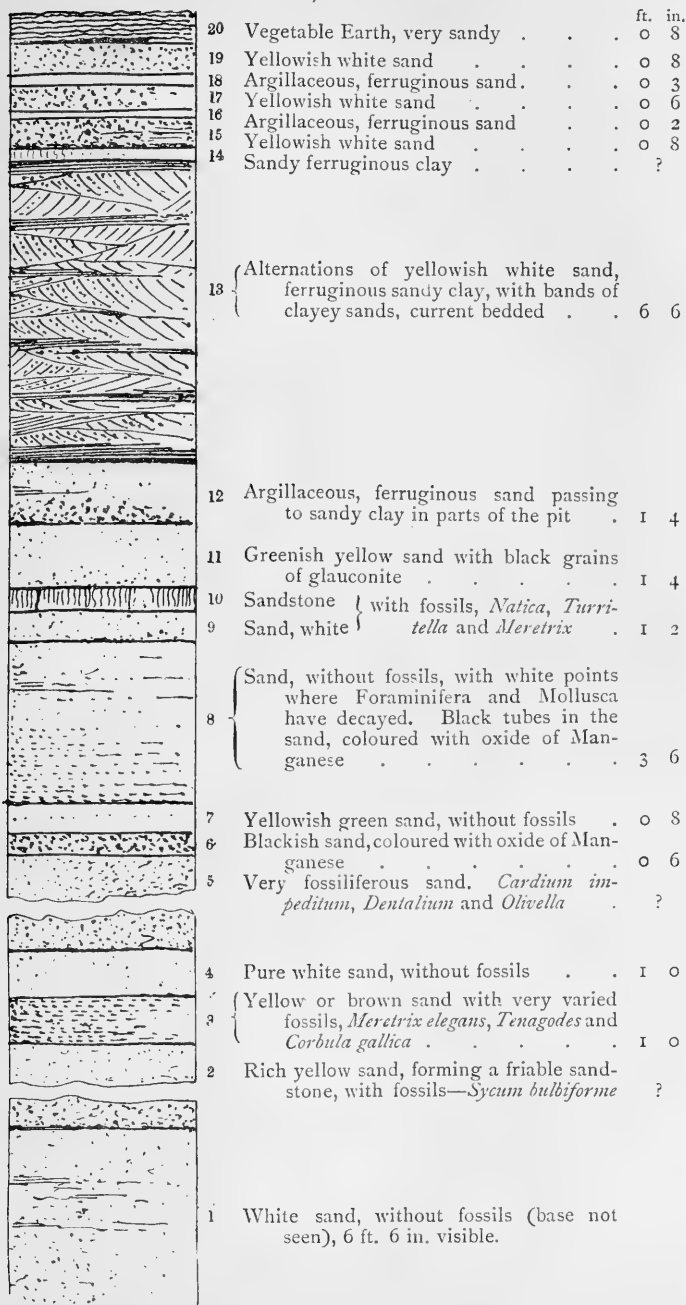
The upper portion of this horizon of the Sables Moyens is characterised in some districts by the intercalation of a fresh-water limestone (*Calcaire de Ducy, Nanteuil, &c.*) containing *Bithinia tuba*, *Limnæa arenularia* and others; this has some analogy on the one hand with the fauna of the Sands of Beauchamp, and on the other with the St. Ouen Limestone; the fresh-water conditions increase as the upper beds of the Sables Moyens are reached, until a distinctly lacustrine series is met with in the St. Ouen Limestone.

UPPER SABLES MOYENS (Horizon of Mortefontaine).—The upper part of the Sables Moyens consists of an alternating series of sands more or less argillaceous in part, and thin-bedded limestones with a distinctive and varied series of fossil remains.

† A section at this locality is given by G. Dollfus in *Contrib. à la Stratig. Parisienne*; *Bull. Soc. Géol. Fr.*, 3^e sér., t. viii. (1880), together with many sections of the Sables Moyens of the Paris Basin.

FIG. 9.—*Middle Sables Moyens: Horizon of Beauchamp.*

Section near Ver, road to Ermenonville.

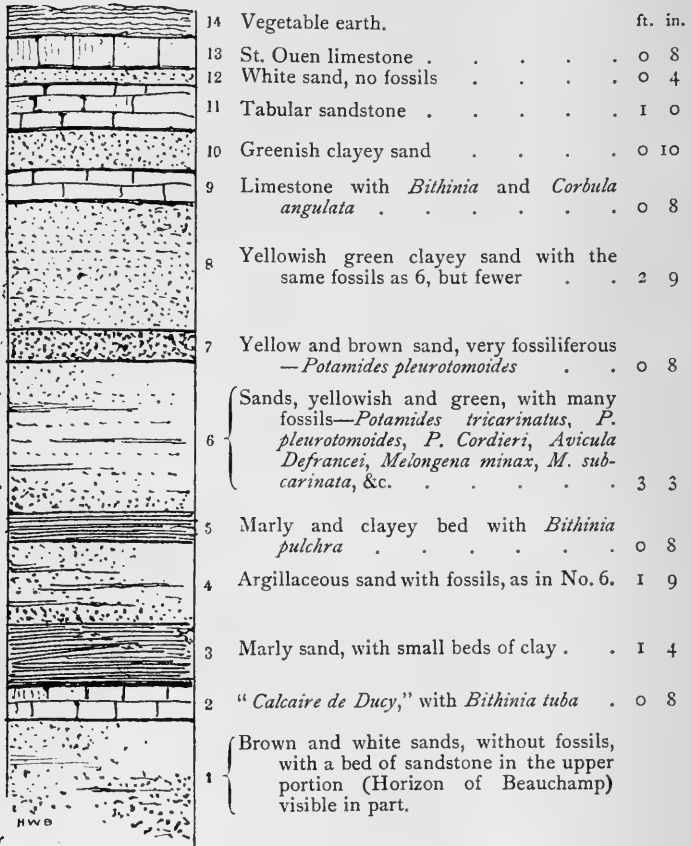


From Dr. Hovelacque's notes.

This division can be well studied at Mortefontaine and La Chapelle-en-Serval, at which latter locality the junction with the *Calcaire de Ducy* (= the Horizon of Beauchamp) is seen and the Sables Moyens are capped by the St. Ouen Limestone.

FIG. 10.—*Upper Sables Moyens (Horizon of Mortefontaine) and junction with Middle Sables Moyens.*

Section at La Chapelle-en-Serval.



From Dr. Hovelacque's notes.

Although not very varied in species, the fossils are exceedingly plentiful in this horizon, the band in yellow sand at La Chapelle being literally a compact mass of *Potamides tricarinatus*, *P. Cordieri*, *P. pleurotomoides* and *P. Roissy*; the colour bands and the coloured

tuberculations are beautifully preserved on the *P. pleurotomoides*. *Melongena minax* is found, though somewhat rarely, but *Melongena subcarinata* and *Tritonidea polygona* are met with just above the *Potamides*-bed in large numbers.

Below the *Potamides*-bed, *Avicula Defrancei* is found, and this is an important fossil from a stratigraphical point of view, being characteristic of this horizon.

Much general information on the Sables Moyens is given in the paper by M. G. Dollfus already cited and in the *Bull. Soc. Géol. Fr.*, 3^e sér., t. vi. (1878), pp. 243, *et seq.* The junction with the Calcaire Grossier is well shown in the Méry section and the neighbourhood of Le Guépelle.

At the last-mentioned locality, also, the three horizons of the Sables Moyens are well developed.

General Section at Le Guépelle (near Survilliers).*

| | |
|--------|--|
| Upper | { Clay bed. Tabular sandstone with <i>Potamides tricarinatus</i> , <i>P. pleurotomoides</i> , <i>P. Cordieri</i> and <i>Avicula Defrancei</i> =Horizon of Mortefontaine. |
| Middle | { Sands without fossils. Sands with <i>Cerithium tuberculosum</i> , <i>C. mutabile</i> , &c.=Horizon of Beauchamp. |
| Lower | { Calcareous sands, very fossiliferous, with <i>Ampullina parisiensis</i> , <i>Calliomphalus moniliferum</i> , <i>Sycum bulbiforme</i> , <i>Volutilithes labrella</i> , <i>Potamides Bouei</i> , <i>Bayania lactea</i> , <i>Cardita sulcata</i> , <i>Corbula gallica</i> , and <i>Callianassa</i> =Horizon of Auvers. |

The Upper Calcaire Grossier is seen in the railway cutting near by.

12. LIMESTONE OF ST. OUEN.

THE passage from the Sables Moyens to the St. Ouen limestone is a very gradual one, and the lacustrine character of the latter bed renders it difficult to institute a correlative comparison between it and the marine Sables Moyens. We have seen that the lacustrine facies set in during the preceding period, as witness the fresh-water limestones of Ducy, of Nanteuil, in the railway cutting at Méry, &c., and that its fossils are partly characteristic of the Beauchamp sands and partly of the St. Ouen limestone.

The St. Ouen limestone ("*travertin inférieur*" of some authors) is in the aggregate from thirty-two feet to sixty-five feet in thickness, and is white and marly, with thin sandy beds and fresh-water fossils. Its lowermost bed lies on the zone of *Avicula Defrancei* of the Sables Moyens. M. G. Dollfus† has divided this limestone into two parts, following the separation by a marine band having the closest affinities with the *Avicula*-zone of Mortefontaine. The two beds of limestone are very similar to each other, but the lower is compact, while the upper is marly with numerous siliceous nodules, characterised by the presence of *Limnæa*. Well-known fossils, such as *Limnæa longiscata*, *Dissostoma*

* From Dr. Hovelacque's notes.

† Dollfus, *Bull. Soc. Géol. Fr.*, 3e. sér., t. vi. (1878), p. 42.

mummia, *Planorbis goniobasis* and *Hydrobia pusilla*, occur. To the north of Paris the stone is occasionally quarried for road-metal.

In the environs of Rheims the formation is composed of marls, clays, and more or less siliceous limestones, passing frequently into the *meulière* with *Limnæa longiscata* and *L. acuminata*. M. de Lapparent says* that the same beds at Germaine, near Épernay, contain lenticular pieces of hard clay. Towards the south we find on this level the fibrous limestone of Provins which passes into the marble of Givray.

At Paris the St. Ouen limestone is very variable in character. M. Michelot has shewn† from a section in the Avenue de l'Impératrice that, although it was only twenty-four feet in thickness, it contained no less than thirty-six distinct beds. A good exposure along the Boulevard Maiesherbes has been described by M. Goubert;‡ here the beds were chiefly marls and difficult to correlate with those on the same horizon even in the immediate vicinity. Other noteworthy developments of the St. Ouen beds have been chronicled by MM. G. Dollfus and Vasseur in their celebrated work§ on the geological section along the Méry-sur-Oise railway, between Valmondois and Bessancourt (Seine et Oise); by MM. Carez and Vasseur|| at La Frette-sous-Cormeilles; and M. de Boury¶ at Magny.

13.—GYPSUM BEDS AND MARLS.

THE alternating beds of gypsum and marls which have such an enormous extension in the Parisian area, although normally found above the St. Ouen limestone or the local sands of Monceaux, sometimes repose directly on the Sables Moyens. The total thickness of the formation varies from 180 feet at Sannois and 162 feet at the classical section of Montmartre, to 100 feet at Montmorency and 50 feet on the plateau of Carnelle.

Where the succession is unbroken the sections usually present the following:—

Sub-divisions of the Gypsum beds and marls.

- | | |
|---|------------------------------|
| 10. White marls of Pantin with <i>Limnæa strigosa</i> , remains of birds, &c. | |
| 9. Blue marls with pyrites | |
| 8. <i>First mass</i> of gypsum with <i>Paleotherium</i> | } Limestone of Champigny. |
| 7. Yellow marls with flints | |
| 6. <i>Second mass</i> of gypsum with <i>Cerithium</i> marls | } |
| 5. Marls with <i>Lucina</i> | |
| 4. <i>Third mass</i> of gypsum | |
| 3. Yellow marls with <i>Pholadomya ludensis</i> | |
| 2. <i>Fourth mass</i> of gypsum | |
| 1. Green sands of Monceaux and Argenteuil with <i>Mytilus Biochei</i> | |

* De Lapparent, *Tr. de Géol.*, 2 ed. (1885), p. 1137.

† Michelot, *Bull. Soc. Géol. Fr.*, 2e. sér., t. xii. (1855), p. 1314.

‡ Goubert, *Bull. Soc. Géol. Fr.*, 2e. sér., t. xviii. (1860), p. 80.

§ Dollfus and Vasseur, *id.* 3e. sér., t. vi. (1878), p. 243.

|| Carez and Vasseur, *id.* 3e. sér., t. iv. (1876), p. 472.

¶ De Boury, *id.* 3e. sér., t. xii. (1884), p. 673.

The formation is naturally divided into two groups: (1) the lower marine and (2) the upper lacustrine. Taking advantage of this circumstance M. Dollfus conveniently abridges the subdivisions as follows:—

Divisions of the Gypsum beds and marls.

| | | |
|--------------------|---|--|
| Lacustrine period. | } | <i>d.</i> Lacustrine and marshy beds: blue and white “ <i>suprà-gypseuses</i> ” marls. |
| | | <i>c.</i> Marsh-bed horizon: First mass of gypsum. |
| Marine period. | } | <i>b.</i> Brackish and marine beds: 2nd, 3rd, and 4th masses of gypsum. |
| | | <i>a.</i> Marine beds: green sands “ <i>infra-gypseux</i> ” of Monceaux. |

(*a.*) GREEN SANDS OF MONCEAUX.—These sands were so called by M. Ch. d’Orbigny from the circumstance that they were typically developed in the railway cutting at Monceaux on the Saint Germain line. They contain *Potamides tricarinatus*, *P. concavus*, *P. Cordieri*, *Lucina saxorum*, *Cardium granulosum*, and other fossils clearly indicating their close affinity with the Sables Moyens, in spite of the intercalation of the St. Ouen limestone.

(*b.*) MARINE GYPSUM BEDS.—The lower part of the gypsum, which, as we have seen, contains certain marine horizons, is composed of alternating beds (thin, but generally of considerable extension) of marl and crystalline gypsum. The fourth, or oldest, bed of gypsum can be easily studied in sections near Argenteuil and Romainville; it is confined to the centre of the basin. The third bed terminates (in ascending order) with the *Lucina*-marls which contain an interesting fauna, *Lucina inornata*, *Corbula subpisum*, *Corbulomya Nycti*, *Nucula capillacea*, *Planorbis spiruloides* and *Potamides Roissyi*.* The majority of the fossils are well-known Eocene types; but the presence of *Corbula subpisum* and *Corbulomya Nycti* foreshadow the incoming of the Oligocene. The second bed of gypsum terminates the marine facies of the formation. Fossils are very rare in the included beds; but we may cite *Potamides pleurotomoides*, *P. tricarinatus*, and *Mesalia incerta*, all three of which are characteristic Eocene species found by M. Goubert† in the yellow marls.

The marine gypsum and marls have been cited, amongst other places, as occurring at Montmartre, Bry-sur-Marne, Argenteuil (Butte d’Orgemont, Carrière Bast. Fig. 11), Montigny, Herblay and Frépillon.

MM. Raulin‡ and Eck§ have shown that the limestone of Ludes, near Rheims, is approximately of the same age as the “*infra-gypseuses*” *Pholadomya*-marls of Paris.

(*c.*) LACUSTRINE GYPSUM BEDS.—The first mass or lacustrine gypsum beds are the most developed (sixty-five feet at Montmartre),

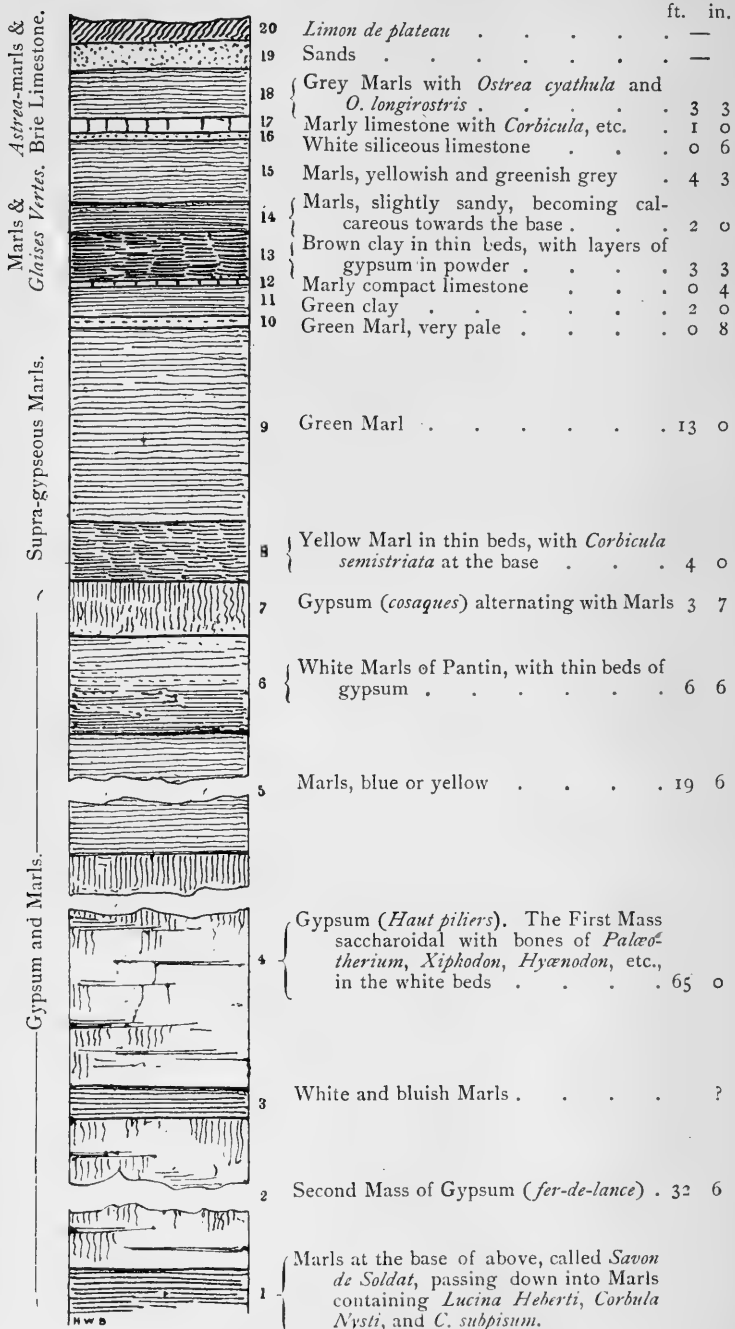
* For an excellent description of the marine marls of the Gypsum formation see Carez, *Bull. Soc. Géol. Fr.*, 3e. sér., t. vi. (1878), p. 187.

† Goubert, *Bull. Soc. Géol. Fr.*, 2e. sér., t. xvii. (1860), p. 600; and t. xxiii. (1866), p. 340.

‡ Raulin, *Bull. Soc. Géol. Fr.*, 1e. sér., t. xiv. (1842), p. 42.

§ Eck, *Pr. Verb. Soc. Malac. Belg.*, t. vii. (1878), p. v.

FIG. 11.—General Section at *Butte d'Orgemont (Carrière Bast)*.



From Dr. Hoveclacque's notes.

extended and constant horizon of the series. It is of great economic value, being the principal mass of gypsum which furnishes the celebrated "plaster of Paris." From this bed at Montmartre the renowned Cuvier obtained *Palæotherium magnum*, *P. medium*, *P. minus*, *Anoplotherium commune*, *Xiphodon gracilis*, &c. The gypsum itself is so homogeneous that it is difficult to recognise any divisions, but its junction with the beds both above and below is uneven.

(d.) SUPRA-GYPSEOUS MARLS.—These important marls are of considerable thickness and as they are found at many points and in several gypsum quarries can be easily studied. They are divided into two parts as before stated:—(1) The lower blue marls, with but few fossils, including *Planorbis inflatus* and *Bithinia Duchasteli*, well developed at Frépillon; and (2) The upper white marls with *Limnæa strigosa*, *Chara Tournoueri*, &c., seen typically at Romainville, Villeparisis, Essonnes, Méry-sur-Oise and Montfort-l'Amaury.

The similarity of certain of the "supra-gypseous" beds to the Oligocene green marls above, together with their variability, have led to much confusion in the classification of this portion of the Parisian Tertiaries; but the careful manner in which they have now been worked out by MM. Dollfus, Carez, Vasseur, and other French geologists, leaves but little to be desired.

LIMESTONE OF CHAMPIGNY.—At Champigny-sur-Marne and district, the gypsum and marls of the environs of Paris undergo a sudden transformation into a travertine. M. Hébert* has proved that this bed, which is largely quarried in the manufacture of lime, and is twenty-nine feet in thickness, comes between the *Pholadomya ludensis*-beds of the gypseous series and the "*Cyclostoma truncatum*"-marls, thus demonstrating its contemporaneity with the Paris gypsum series. The limestone of Champigny is also developed at Château Thierry, in the valley of the Essonne, Juine, Orge, &c.

To this formation the limestone or "*travertin supérieur*" of Provins and the marls of Tardenois belong.

* Hébert, *Bull. Soc. Géol. Fr.*, 2e. sér., t. xvii. (1860), p. 800.

NOTE TO FIG. 11.

A photographic view of this magnificent section, and detailed measurements of all the minor sub-divisions of the beds, are given in the Vertical Sections of Sheet 48, *Carte Géol. det. de France*, pl. i.

In a quarry near the railway, close by, the 3rd and 4th masses of Gypsum are seen, and below the latter a green sand in contact with the St. Ouen Limestone.

THE OLIGOCENE BEDS.

FRENCH authors are not agreed as to the exact limits of the Eocene and Oligocene beds in the Paris basin, a divergence of opinion which arises from the circumstance that the passage from the one to the other series is very gradual. The following may be given as embodying the views of a few leading geologists on this subject:—

| <i>Divisions of the beds.</i> | <i>Classification of MM. Cossmann and Lambert* and Dollfus.†</i> | <i>Classification of M. de Lapparent‡ and the Geol. Survey of France.§</i> |
|---------------------------------|--|--|
| Brie limestone | | Oligocene (<i>pars.</i>) |
| Green marls | Oligocene (<i>pars.</i>) | |
| Supra-gypseous marls | | |
| Lacustrine gypsum | | Eocene (<i>pars.</i>) |
| Marine gypsum | Eocene (<i>pars.</i>) | |
| Sands of Monceaux | | |
| Limestone of St. Ouen | | |
| Sands of Beauchamp | | |

It is not our intention to discuss the various points at issue, but we shall adopt the views of the officers of the French Geological Survey in regard to the matter both in our text and in the accompanying map; and we will now glance at the geographical distribution of the Oligocene as thus defined. The main mass roughly occupies the southern half of the Paris basin; commencing at Montargis, the boundary runs northwards through Montereau, Villenauxe, Sézanne, Avize, Verzy; thence westwards through Ville-en-Tardenois, Meaux, Ecoeu, Mantes; then turning south passes by Houdan, Nogent-le-Roi, Chartres, and near Bonneval. On the southern limits of the basin, the Oligocene passes under the Miocene of the Loire, and thus leaves the region now under consideration. Formerly, however, the Oligocene beds must have had a much wider extension, for many outliers occur outside the boundary just laid down, especially on the northern part of the basin. A glance at the map will show this.

* Cossmann and Lambert, *Mém. Soc. Géol. Fr.*, 3e. sér., t. iii. (1884), table facing p. 44.

† Dollfus, *Bull. Soc. Géol. Fr.*, 3e. sér., t. vi. (1878), pp. 269-293.

‡ De Lapparent, *Tr. de Géol.*, ed. 2, (1885) pp. 1138, 1166.

§ Various publications, *Carte Géol. de France*, scale $\frac{1}{1,000,000}$, &c.

Classification of the Paris Basin Oligocene.

| | | | |
|-------------|---|---|---|
| Aquitanian. | { | 13. Sands of the Gâtinais. | |
| | | 12. Limestone of Beauce ; <i>meulière</i> s of Montmorency. | |
| | | 11. Marls of Étampes. | |
| | | 10. Sands of Ormoy. | } Sands and sandstone of Fontainebleau. |
| | | 9. Sands and pebble beds of Saclas. | |
| | | 8. Falun of Pierrefitte. | |
| | | 7. Sands of Vauxoux. | |
| Tongrian. | { | 6. Pebbly sands of Étrechy. | } Fontenay Sands. |
| | | 5. Sands of Morigny. | |
| | | 4. Falun of Jeurre. | |
| | | 3. <i>Osirea</i> -marls and <i>molasse</i> of Étrechy. | |
| | | 2. Limestone and <i>meulière</i> s of Brie. | |
| | | 1. Green marls. | |

The word Tongrian is derived from Tongres in Belgium ; and Aquitanian from Aquitaine, where the beds are well developed.

1. GREEN MARLS.

THESE plastic green clays are well known in the environs of Paris, they are from thirteen to sixteen feet in thickness, and have been subdivided as follows :—

2. "*Vert franc*," worked for tile-making, containing rather large concretions formed of sulphate of strontian mixed with argillaceous matter.

1. Yellow thin-bedded marl characterised by the abundance of *Corbicula semistriata* ; this is the "*Cyrena*-marl" of some authors.

The beds are of fluviomarine origin, and are fossiliferous on the northern outcrop and unfossiliferous to the south. The fossils mostly consist of casts, but at one place—Fleurines, between Pont-St.-Maxence and Senlis—are fairly well preserved. Only eleven species of mollusca, however, are known from this horizon in the whole basin.* They are—*Psammobia plana*, *Donax Brongniarti*, *Meretrix incrassata*, *Corbicula semistriata*, *Modiolaria Brauni*, *Bithinia Duchasteli*, *Planorbis depressus*, *Potamides plicatus*, and var., *P. Weinkauffi*, *Natica Nysti* and *Bayania Nysti*.

The Green Marls may be seen, amongst other places, at Frépillon,† La Ferté-Alais, Bouray, Chamarande, Étrechy, Corbeil and Essonnes. MM. Carez and Vasseur give‡ a section, of which the following is a *résumé*, at the last-mentioned place :—

| <i>Section at Essonnes.</i> | | ft. | in. |
|--|--|-----|-----|
| White sandy argillaceous marls | | 3 | 3 |
| Green clay marls | | 3 | 6 |
| Whitish marls | | 0 | 3 |
| Green clayey marls | | 2 | 4 |
| Whitish limestone | | 0 | 3 |
| Green clayey marls | | 4 | 0 |
| Whitish limestone | | 0 | 5 |
| Greenish thin-bedded marls with <i>Cyrena convexa</i> (= <i>Corbicula semistriata</i>) | | 2 | 2 |

* Cossmann and Lambert, *op. cit.*, p. 6, where nine species only are mentioned.

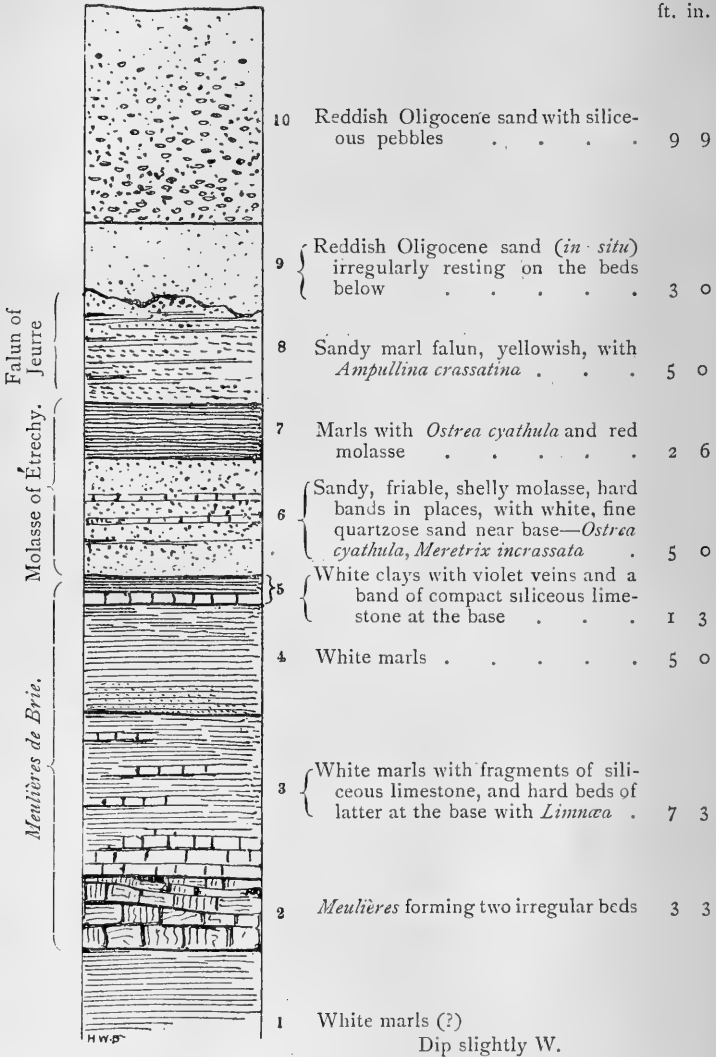
† Dollfus and Vasseur, *Bull. Soc. Géol. Fr.*, 3e. sér., t. vi. (1878), pp. 265-6.

‡ Carez and Vasseur, *Bull. Soc. Géol. Fr.*, 3e. sér., t. v. (1877).

2. LIMESTONE AND MEULIÈRES OF BRIE.

THIS bed is also known as "*travertin moyen.*" It is well developed in the country whence it derives its name, and also round Paris; it is composed of compact or cavernous siliceous limestone (*meulières*), in irregular beds, alternating with marls.

FIG. 12.—Section of the Quarry of Vintué (near Étrecthy).



The strata are well exhibited in a section to the north of the farm of Vintué, as well as in front of the Château of Brunehaut, both near Étrechy; whilst they are also found at Sannois, Montmartre, Pantin, Noisy-le-Sec, Villeparisis and La Ferté-sous-Jouarre. The limestone is essentially lacustrine in character, but fossils are rare. The principal are *Limnea cornea*, *Planorbis cornu*, and *Bithinia Duchasteli*.

M. Douvillé has shown* the close affinity existing between these beds and the reddish and grey limestones, which, near Fontainebleau pass to the "*Calcaire de Château-Landon*."

3. OSTREA-MARLS AND MOLASSE OF ÉTRECHY.

THIS bed, well represented on the hills in the northern part of the Oligocene area, is of regular occurrence, from 130 feet to 195 feet in thickness, and composed of marls and white and yellow quartzose, slightly micaceous sands. In the north-west, at Neuilly-en-Vexin, near Chars, M.M. Hébert and Renevier found † *Potamides trochlearis* and *P. plicatus*. In the Parisian area the marls contain an abundance of *Ostrea cyathula* and *O. longirostris*, with *Corbula subpisum*. The bed is well represented in the classic locality of Montmartre, where an intercalated calcareous stratum with *Cyrena*, *Cerithium*, &c., exhibited lacustrine characters. ‡ This same lacustrine bed has also been found in a cutting at Ville d'Avray on the St. Cloud railway, and at Sannois. M. G. Dollfus is of opinion § that the small fauna indicates close affinities with that of the Brie limestone. The lower horizon of the *Ostrea*-marls is particularly interesting at Sceaux, Massy and Palaiseau.

On going south of Paris these marls change their character and thin out near Étrechy, where the last vestiges become more split up by beds of friable, yellowish, sandy and marly limestones, and M. Lambert gave || the whole the name of "*Molasse d'Étrechy*." At that place this bed is very fossiliferous with a marine fauna, but the fossils are difficult to extract entire, being mostly casts and imprints. Here and there thin bands may be found where the shells are silicified. Amongst the Mollusca recorded as occurring in the formation we may cite *Bayania semidecussata*, *Potamides plicatus*, *Bittium sublima*, *Brachytrema Boblayei*, *Trochus subincrassatus*, *Meretrix incrassata* and *Perna Heberti*.

Speaking in general terms the Molasse of Étrechy is about 6 ft. 6 in. in thickness round Étampes. It is seen at Vintué, at Gillevoisin near Chamarande, also at Jeurre (p. 38) underneath the bed with *Ampullina crassatina*, along the Orléans railway, near Brunehaut and other places.

* Douvillé, *Bull. Soc. Géol. Fr.*, 2e. sér., t. xxviii. (1871), p. 52.

† Hébert and Renevier, *Desc. Foss. tert. Num. sup. des env. de Gap*, Grenoble (1854), pp. 35, 38, 39.

‡ La Jonkaire, *Bull. Soc. Géol. Fr.*, 1e. sér., t. i. (1831), p. 223.

§ Dollfus, *Bull. Soc. Géol. Fr.*, 3e. sér., t. vi. (1878), p. 293.

|| Lambert, *Bull. Soc. Géol. Fr.*, 3e. sér., t. iv. (1876), p. 501.

There is a fine section of the molasse in a quarry at Vintué, near Étrechy, where it occurs in beds compact enough to form good ashlar stone. Fig. 12, p. 36, is a *résumé* of this section from details by M.M. Cossmann and Lambert. This section is very useful as showing the relations of the Molasse of Étrechy to the falun of Jurre and the Meulières of Brie; and it also exhibits the exceedingly variable character of the whole of this portion of the Paris basin Oligocene.

We may here remark that we consider these Oligocenes to have been too minutely subdivided, and that at best many of the formations mentioned have a local value only. We do not recognise, for instance, that the *Ostrea*-marls and Molasse of Étrechy, or the Sands of Vauroux, have the same geological, or palæontological, value as, say, the Calcaire Grossier or the Sables Moyens in the Eocenes. At the same time it is convenient to treat of them in detail because of the assistance they afford in correlating Oligocene beds in other parts of the basin. As in England and elsewhere, the alternation of marine with fresh-water beds has led to much difficulty in classification.

For other details concerning this formation consult Lambert, *Bull. Soc. Géol. Fr.*, 3e. sér., t. ix. (1881), p. 501; *Nouv. Arch. du Museum* (1880), p. 265.

4. FALUN OF JEURRE.

THIS horizon of the Étampes Oligocenes is typically developed in a large sand pit near Jeurre church, on the right-hand side of the road from Étrechy to Étampes (see p. 56). Here the majority of the Oligocene mollusca described by M. Deshayes* were found; and when studying the strata in this district in 1889 we came to the conclusion that Jeurre is the best fossiliferous locality at present available, though Pierrefitte would not be bad, if perchance the section there should be re-opened.

The details we noted do not differ from the published accounts of the exposure, except that on the occasion of our visit the lowermost beds were not clearly definable.

| | | ft. | in. | |
|-------------------------|--|--|-----|---|
| | | <i>Section at Jeurre†.</i> | | |
| | Drift | 6 | 6 | |
| | Fine quartzose grey sand with fragments of <i>Axinæa</i> , and having reddish bed with black pebbles at the base | 1 | 7 | |
| Sands of Morigny. | { | Quartzose grey sands with <i>Meretrix splendida</i> , <i>Lucina Heberti</i> ; falun and sands with <i>Axinæa obovata</i> ; yellowish fine quartzose sands with <i>Cominella Gossardi</i> , &c. | 5 | 9 |
| | | Red falun with <i>Axinæa obovata</i> | 1 | 7 |

* Deshayes, *Coquilles foss. des env. de Paris*; and *Anim. sans vert. du Bassin de Paris*.

† Abridged from Cossman and Lambert, *op. cit.*, p. 13.

| | | | |
|------------|--|---|-----|
| Falun | } Yellow earthy sand with <i>Trochus</i> ; falun with of <i>Meretrix incrassata</i> , <i>Potamides plicatus</i> , &c. | ft. | in. |
| Jeurre. | | 5 | 2 |
| Molasse of | } Yellowish marly sand with <i>Amp. crassatina</i> | 0. | 8 |
| Étrechy. | | Sandstone with <i>Ostrea cyathula</i> (base not seen) | 1 |

M. Tournouër has given* an interesting account of the general nature of the fossils found; whilst the following species may be cited as truly characteristic of the horizon of the falun of Jeurre—*Gastrochiena Raulini*, *Syndesmya Sandbergeri*, *Meretrix stampinensis*, *Lima Klipsteini*, *Conus symmetricus* and *Deshayesia parisiensis*.

The lower members of the Étampes Oligocenes are also met with at Versailles and Neuilly-en-Vexin, where the fauna has been compared with that of the falun of Jeurre: whilst M. Tournouër places the beds of St. Christophe-en-Halatte on this horizon.

5. SANDS OF MORIGNY.

THE typical section of this horizon occurs in a copse, the position of which is explained on p. 56. All that was visible at the time of our visit consisted of a few feet of grey or white sand, full of fossils of but few species. The most abundant of these were, *Potamides trochlearis*, *P. plicatus*, var. *Galeotti* (occurring in thousands; all very small), and *Bayania semidecussata*. The specimens of *Potamides trochlearis* are very remarkable, the outer shell being worn away, and only the columella left with the spiral divisions winding round it, so that the species resembles a screw having a very exaggerated, close thread; this is entirely characteristic. Other fossils are *Axinea obovata*, *Typhis cuniculosus*, *Lampusia flandrica*, and, rarely, *Volutilithes Rathieri* and *Axinea angusticostata*. The Morigny sands are developed (as will have been noticed) in the sand-pit at Jeurre (*supra*); and are also found at St. Phalier, and Faubourg St. Michel, Étampes.

SANDS OF FONTENAY.

The faluns of Jeurre, and sands of Morigny of the Étampes district are represented in the environs of Paris by a deposit known as the "Sands of Fontenay," from the village of Fontenay-aux-Roses, where they are typically developed. They are essentially yellow sands, practically unfossiliferous, of considerable thickness, and have a wide horizontal extension round the French metropolis, forming the foundations of almost all the new forts. Other sections worthy of note are at Chatillon and Romainville.

SANDS AND SANDSTONES OF FONTAINEBLEAU.

Succeeding the sands of Fontenay, we have the sands and sandstones of Fontainebleau. M. Ch. d'Orbigny showed the difference

* Tournouër, *Bull. Soc. Géol. Fr.*, 3e. sér., t. vi. (1878), p. 672.

between these two horizons, but French geologists are not in accord as to their exact relations. We have no space to enter into this matter, but the following works may be consulted with advantage—Dollfus, *Bull. Soc. Géol. Fr.*, 3e. sér., t. vi. (1878), p. 299, and observations thereon by MM. Cossmann and Lambert, *Mém. Soc. Géol. Fr.*, 3e. sér., t. iii. (1884), p. 18.

The Fontainebleau beds are almost unfossiliferous in the vicinity of the town from which they derive their name, but in the Étampes district they develop into the shelly sands, &c., as we have already seen. Many French authors regard the whole of these beds, including those of Jeurre and Morigny, as comprised in the Fontainebleau beds, and allude to them collectively as the "*Sables de Fontainebleau et d'Étampes.*" It is tolerably clear, however, that the sandstone of Fontainebleau is on the same horizon as that of Ormoy, near Étampes, presently to be described.

6. PEBBLY SANDS OF ÉTRECHY.

THESE sands are unconformable to the beds beneath, and sometimes repose directly on the molasse of Étrechy without the intervention of the faluns of Jeurre and sands of Morigny. This point is conclusively proved by the section of the falun at Brunehaut, about half-way between Étrechy and Étampes. These pebbly sands are a littoral deposit, being grey, fawn, or chamois colored sands, with numerous flint pebbles.

The following typical section* may be seen at the farm of St. Phalier, near Jeurre:—

Section at St. Phalier.

| | ft. | in. |
|--|-------|-----|
| Vegetable earth | about | 1 6 |
| Alternating yellow and brown sand | | 2 7 |
| Brown and argillaceous sands, with pebbles | | 1 7 |
| Brown sand, ferruginous in parts, with pebbles, lying unevenly on bed below | | 4 8 |
| Sands with large pebbles irregularly dispersed, unconformable to the underlying bed | | 3 3 |
| Sands of Morigny with <i>Meretrix splendida</i> , developing from a mere thread-like bed into a thickness of | | 3 3 |
| Red falun, with <i>Axinæa obcvata</i> , visible; reposing on the falun of Jeurre a little further on . | | 1 3 |

A little to the north of the section of St. Phalier, and about 120 yards from the sand-pit at Jeurre, another fine exposure of the pebbly sands of Étrechy, may be seen. Here are found a large number of the teeth of *Lamna* and *Myliobatis*, and ribs of *Halitherium*.

Much information concerning this division of the Oligocene will be found in the admirable work of M. Tournouër, *Bull. Soc. Géol. Fr.*, 3e. sér., t. vi. (1878), pp. 675, *et seq.*

* Abridged from Cossmann and Lambert, *op. cit.*, p. 18.

7. SANDS OF VAUROUX.

THE beds immediately above the pebbly sands of Étrechy are difficult to work out. M. Lambert has demonstrated* the existence of three distinct horizons, the first constituting the sands with *Corbulomya*, properly so-called, containing the falun of Pierrefitte, and having the sands of Vauroux at the base; the second comprises a series of lilac sands with pebbles; and the third is sandstone, or fine sand, with the fauna of Ormoy. Subsequently the same author † sub-divided the *Corbulomya* beds into three parts, describing them in descending order as follows:— (1) Falun of Pierrefitte, (2) sands of Vauroux, and (3) sands of Étampes. Eventually he, together with M. Cossmann ‡ showed that the last-mentioned sands are simply a lateral modification of those of Vauroux.

The typical section of the Vauroux sands, which occurs near the College of Étampes, in the river valley at the foot of the wood of Vauroux, is thus described by M. Lambert:—

Section at Vauroux.

| | ft. | in. |
|--|---|------|
| Vegetable-earth | about | 1 6 |
| Grey sand without fossils, with a greenish-grey vein . | | 11 6 |
| Grey sand, yellowish, with some siliceous pebbles . | | 4 6 |
| Thin bed of yellowish sand | | 0 3 |
| Sands of Vauroux { | White quartzose sand with nodules of greenish-grey fossiliferous sand | 2 9 |
| | White quartzose fossiliferous sand | 3 0 |
| | Greyish sand in thin beds | 4 0 |
| | White sand with few shells | ? |
| | | |

Characteristic fossils of the Vauroux sands are, *Murex pereger*, *Volutilithes Rathieri*, *Pleurotoma belgica*, *Lucina Thierensi*, *Tellina Heberti*, *Meretrix dubia* and *Corbulomya Morleti*.

It is difficult to trace these beds north of Étampes, because they become unfossiliferous on leaving the typical area.

8. FALUN OF PIERREFITTE.

THIS is composed of white quartzose sands, sometimes micaceous, indistinctly stratified, and frequently having a layer of siliceous pebbles. Its mean thickness is about twenty-six feet. The occurrence of fossils in this formation is purely local, the beds can be followed over wide areas, and are practically unfossiliferous, except here and there where they open out into rich shelly sands, especially at the typical locality of Pierrefitte, which is about three miles due west of Étampes. An exposure of a few feet at Pierrefitte has yielded as many as 170 species of mollusca. On the occasion

* Lambert, *Sables marins de Pierrefitte*, *Nouv. Arch. du Mus.*, 2e. sér., t. iii., p. 257.

† Lambert, *Bull. Soc. Géol. Fr.*, 3e. sér., t. ix. (1881), p. 459.

‡ Cossmann and Lambert, *Mém. Soc. Géol. Fr.*, 3e. sér., t. iii. (1884), p. 21.

of our visit to the district, we were informed that this exposure was closed ; but it will no doubt be opened from time to time as the neighbouring farmers require to make use of the valuable deposit for their lands. Messrs. Cossmann and Lambert give * the following section :—

Section at Pierrefitte.

| | | ft. | in. |
|---------------------------|---|----------|-----|
| Vegetable earth | | 1 | 6 |
| Drift { | Loess with <i>débris</i> from the Beauce limestone | 3 | 0 |
| | Gravels and diluvium sands with large blocks of <i>meulière</i> | 3 ft. to | 9 6 |
| Falun { | Falun, fossiliferous sands | 3 ft. to | 6 6 |
| | Pebble bed | 0 | 3 |
| Pierrefitte { | Fine sands without fossils | 5 | 0 |

The most characteristic fossil of this falun, not only at Pierrefitte, but elsewhere, is *Corbulomya triangula*. The beds contain a decidedly marine fauna although *Potamides Lamarcki*, *Planorbis inopinatus*, and other brackish and fresh-water forms occur. In some sections the teeth of *Lamna* are also found.

The Pierrefitte formation is also well in evidence at Moulineau, and along the valley of the Chalouette at Saint-Hilaire and Moulin de Voujouan, and at Côte-St.-Martin. Other exposures are near Vauvert and Vauroux (p. 41), and in the wood of Vandouleurs (near Morigny). At the last-mentioned locality a friable sandstone is found with *Axinea obovata* and *Meretrix subarata*.

9. PEBBLY SANDS OF SACLAS.

THIS horizon, which is met with to the south of Étampes is littoral in origin ; the sands are of lilac, yellow and grey tints, fine, quartzose, occasionally finely stratified, and alternating with beds of pebbles. The formation is best seen in the vicinity of Châlo-Saint-Mars, but it is also exposed at Boissy-la-Rivière, Saclas, Méréville, Petit-Saint-Mars and Ormoy, all of which are no great distance from the convenient Oligocene centre—Étampes. The only fossils found in the beds are rolled teeth of *Lamna*, which are probably *remaniés*.

10. SANDS OF ORMOY.

THIS characteristic and important horizon is rarely more than thirteen feet in thickness, but is very useful for correlating purposes. As we have previously mentioned (p. 40), it is regarded as the equivalent of the Fontainebleau sandstone. The quartzose white Ormoy sands frequently become compacted into a hard sandstone with a calcareous matrix, which is used for building purposes ; and by resisting erosion is often seen playing the rôle of a protecting shield on the tops of the hills round the typical

* Cossmann and Lambert, *op. cit.*, p. 23.

locality Ormoy-la-Rivière, south of Étampes. The only two fossiliferous localities in these beds are at Ormoy and Châlo-Saint-Mars. We visited the former place, but no good section was visible; a few lumps of stone and a dirty grey sand occurred on the edge of a ploughed field high on the hill to the east of the village, and here and there the characteristic fossil, *Cardita Bazini*, and others put in an appearance, but that was all. The Ormoy beds in their unfossiliferous condition, however, are extremely easy to study in the locality, owing to the numerous quarries in them for building stone. Perhaps the finest section is the one we saw at Côte-St.-Martin, where the overlying beds are also well developed. Other exposures are at St. Hilaire, Valnay, Lardy, Bouray, La Ferté-Alais and Maisse. In certain places the uppermost beds are of fluviatile origin, which, together with the palæontological evidence, is an indication of the close affinities subsisting between this horizon and the Beauce limestone, presently to be described; in other words, it attests the intimate relationships of the Tongrian with the Aquitanian. We would especially draw attention to this fact as showing the complete succession of this important phase of the Oligocenes in the vicinity of Étampes, and its bearings on the general question of the sub-division of this part of the European Tertiaries. That the line can easily be drawn between the Tongrian and Aquitanian beds in other Tertiary basins we freely admit, but the division seems very arbitrary so far as the Paris basin is concerned.

11. MARLS OF ÉTAMPES.

ABOVE the Ormoy sand and sandstone comes the local horizon known as the *Bithinia*-marls of Étampes. It is essentially a passage bed, containing *Limnea*, *Planorbis*, *Pupa*, *Helix* and certain plants (*Chara medicaginula*, for example), and it is covered by the formation next described.

12. LIMESTONE OF BEAUCE.

THESE beds are sometimes known as the "*Travertin de Beauce*," or "*Travertin supérieur*."

As the Beauce Limestone is traced northwards from the typical locality it becomes much altered in character, and is then called the "*Meulières de Montmorency*." These *meulières* are well developed on the plateaux round Paris where the lower portions are sometimes fossiliferous, containing *Potamides*, &c. *Helix Ramondi* has been found at Trappes*, whilst M. Dollfus has detected *Valvata disjuncta* at Frépillon. This latter authority says† that the Beauce Limestone, taken together with its altered facies the "*Meulières de Montmorency*," covers the greater part

* Tournouër, *Bull. Soc. Géol. Fr.*, 2e. sér., t. xxiv. (1867), p. 489.

† Dollfus, *Extension des terr. Tert. bas. Anglo-Parisien*, *Mém. Soc. Géol. Norm.*, *Comptes rendus*, Exp. (1877), p. 18.

of Eure, Vexin, Valois, Brie, and has such a great development to the south that it is difficult to appreciate its limits. It is found in the valleys of the Allier and the Loire, the Cantal and even in the basin of the Garonne.

In the Beauce and neighbouring regions the lacustrine limestone is divided into two parts, separated by a sandy clay.* The lower limestone, the "*Calcaire du Gâtinais*" of M. de Roys, is about forty-eight feet in thickness. It is devoid of flinty matter near Étampes, and the most characteristic fossils are *Limnæa Brongniarti*, *L. cornea*, *Helix Ramondi*, *Planorbis cornu* and *Potamides Lamarcki*. The remains of several mammals have been found at La Ferté-Alais. This bed is well developed at the quarry of St. Marc. It is quarried for building stone, amongst other places, between Beaune-la-Rolande and Montargis. In the Blois district the *Limnæa* limestone is about sixty-five to ninety-seven feet in thickness, and *Amphitragulus elegans*, *Dremotherium Feignouxi*, *Tapirus Poirrieri*, and other mammals are found.†

13. SANDS OF GÂTINAIS.

ABOVE the lower limestone just referred to, comes the "*molasse du Gâtinais*" of M. Douvillé, which is made up of green loam with siliceous sands and sandy Limestone. The total thickness of this local deposit is about forty-eight feet, and south of Étampes it is found between the Beauce Limestone, properly so-called, and the *Helix*-limestone of the Orléanais, which latter is usually, though not always, regarded by French geologists as belonging to the Miocene (see p. 111).

AN OUTLINE GUIDE TO THE PRINCIPAL SECTIONS AND FOSSILIFEROUS LOCALITIES.‡

A DESCRIPTION of the best centres for studying the Tertiary geology of the Paris Basin will, we think, be useful to English geologists ; and, as we have visited many of the best sections, the following hints are chiefly the result of personal experience.

Several sections may often be conveniently reached from a single place ; and we shall, therefore, indicate the various localities which may be visited from each of these centres, with the distance

* Douvillé, *Bull. Soc. Géol. Fr.*, 3e. sér., t. iv. (1876), p. 92.

† *Exp. Carte Géol. Fr.* Blois sheet.

‡ For a complete list of the fossiliferous exposures in the Paris basin consult Stan. Meunier, *Géol. des Env. de Paris*, Paris (1875), pp. 447, et seq.

in English miles* from the same, and mention the formations seen at each section.

Paris forms an excellent starting point, as many of the most interesting localities are within easy reach. If the Dover-Calais route be taken on going from England, some forty to fifty miles travelling can be saved by stopping at Creil; several good exposures exist near that place as will presently be seen.

Topographical and geological maps should, of course, be procured. First, as to the former; those published by L. Baudouin et Cie., 30 Rue et Passage Dauphin, Paris, are the best. Scale $\frac{1}{50,000}$ (about $\frac{3}{4}$ in. to 1 mile), price, one franc each. They are each named from the principal town or city in the sheet, and include an area of forty by twenty-five miles; each bears a distinctive number. The following embrace nearly the whole area of the basin, and certainly all the important parts for the geologist: Rouen (31), Beauvais (32), Soissons (33), Reims (34), Evreux (47), Paris (48), Meaux (49), Châlons (50), Melun (65), Provins (66), Fontainebleau (80). If only the most interesting portion, nearest Paris, is to be studied, Rouen, Beauvais, Soissons, Paris and Evreux are sufficient for the Eocenes, and Melun and Fontainebleau for the Oligocenes.

The geological maps, to the same scale as above, are to be obtained from Messrs. Baudry et Cie., 15, Rue des Saints-Pères, Paris.

A word or two as to the collection of fossils may be useful. Strong calico bags of various sizes, but mostly large, say 12 in. by 7 in. by 4 in., are the best receptacles for fossils, and they should be so made that the mouth can be drawn together and tied by a tape. A brass ring sewn on enables several bags to be threaded on a strap and carried with ease without fear of breakage.

Sift! is the watchword in the Paris area, as the smaller species of mollusca are always missed if this is neglected. Two wire sieves, one sixteen meshes and the other eight meshes to the lineal inch, are suitable. A hammer is not often required; a pointed trowel, with a blade 5 in. or 6 in. long, is exceedingly useful for taking up the loose material. Some chip boxes, to hold the rarer or more delicate species, should be provided. A written label, tied to the ring of each bag, shows at a glance the locality and formation of the contents. For the fossils of the *Sables Inférieurs*, some preservative, such as Potassic Silicate, † is required; or they may be brought away wrapped in cotton-wool, and subsequently treated. But by far the greater number of the fossils are in a magnificent state of preservation, and are easily collected and carried without the least risk of fracturing them.

Space will only allow us to name some of the more important exposures in the Paris basin; but none, however small, should

* Three miles = five kilomètres, very nearly.

† "Water-glass"; procurable at Messrs. Wilcox and Co., 239, Oxford Street, London.

be neglected in studying this area. Many of the richest fossiliferous sections are small in extent, as, for instance, Grignon and La Ferme de l'Orme; in some instances roadside cuttings, of a few feet in height, are crowded with splendid species, as at Mouchy; in other cases, the surfaces of the fields are covered with specimens, as at La Frileuse, near Grignon, and St. Sulpice, near Ver. At the former, very fine specimens of *Cerithium serratum* can be obtained, turned up by the plough. In short, every *sablère*, *coquillage*, and *carrière*, should be examined.

PARIS CENTRE.

Taking Paris as our first centre, the principal points to study in the vicinity are the following. The most fossiliferous are marked X.

| <i>Localities.</i> | <i>Distance and Direction from Paris.*</i> | <i>Formation.</i> |
|-------------------------------------|--|------------------------|
| Montmartre | 2. N. | Gypsum. |
| Argenteuil | 8. N.W. | " |
| Sannois | 9 N.W. | " |
| La Frette-sous-Cormeilles | 11½ N.W. | St. Ouen Limestone. |
| Sartrouville | 10 N.W. | Calcaire Grossier, &c. |
| Montigny | 12 N.W. | Gypsum. |
| Herblay | 12½ N.W. | " |
| x Beauchamp | 13½ N.W. | Sables Moyens. |
| Frépillon | 15½ N.W. | Gypsum. |
| St Ouen | 4 N. | St. Ouen Limestone. |
| Enghien | 8½ N. | Gypsum. |
| Montmorency | 10 N. | Beauce Limestone. |
| Méry | 16½ N.W. | Sables Moyens, &c. |
| x Auvers | 17½ N.W. | " " |
| x Valmendois | 18 N.W. | " " |
| Auteuil | 4 W. | Plastic Clay, &c. |
| Nanterre | 7 W. | Marls of Nanterre. |
| Carrières St. Denis | 8½ W. | Calcaire Grossier. |
| Pantin | 4 N.E. | Gypsum. |
| Romainville | 4½ N.E. | " |
| Bry-sur-Marne | 9 E. | " |
| Champigny-sur-Marne | 9 S.E. | Champigny Limestone. |
| Villeparisis | 14 N.E. | Gypsum. |
| Vaugirard | 2½ S.W. | Calcaire Grossier. |
| Issy | 4½ S.W. | Plastic Clay, &c. |
| Meudon | 6 S.W. | Marls of Meudon, &c. |
| Montrouge | 4 S. | Calcaire Grossier. |
| Gentilly | 3 S. | " " |
| Arcueil | 4 S | " " |

MONTMARTRE.—This celebrated hill in the north of Paris furnished the classic quarries of Gypsum, and provided Cuvier with the chief material for his *Ossemens fossiles*. The beds are very varied in character and thickness. The mammalia were

* Distances in English miles from the centre of Paris, and as the crow flies.

chiefly found in the "First Mass" of Gypsum, and the white marls associated with it. This is now built over.

ARGENTEUIL and neighbourhood can be reached from St. Lazare, and several good quarries are worked in the Gypsum, a little to the north of Argenteuil, on the roads to Sannois and Enghien. A very fine section is that called Carrière Bast, at Orgemont (see p. 32). The downward continuation of the beds can be seen in another quarry nearer the railway.

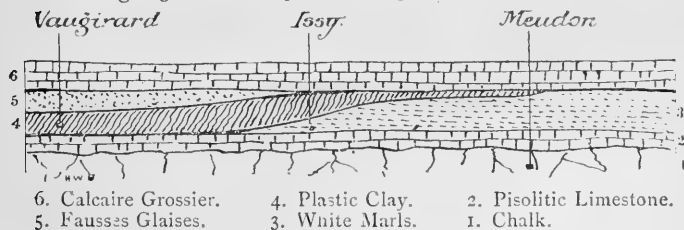
BEAUCHAMP.—From Paris, Gare du Nord, to St. Leu. The fossiliferous sections in the Middle Sables Moyens (Horizon of Beauchamp) are within two miles of the station.

AUVERS, MÉRY, AND VALMONDOIS.—From Paris (Gare du Nord) take train to Auvers. The typical section is about one and a-half miles due north of Auvers, on the top of the hill, passing the church. That at Valmondois is within two miles of, and contains very similar fossils to that at, Auvers. The important section, cut by the railway at Méry, is well described by MM. G. Dollfus and G. Vasseur in the paper already referred to.*

VAUGIRARD, ISSY, AND MEUDON.—The farthest point, Meudon, can be reached from Paris *via* the Gare Montparnasse, and the other sections are within walking distance.

The following sketch section † will readily explain the relation of the beds in this neighbourhood.

Fig. 13.—Section from Vaugirard to Meudon.



ISSY.—The Plastic Clay section at Issy is very near the fortifications, on the south side of the road from Vaugirard to Issy. About one and a-half miles on the road past Issy, and close to the west side of the Fort of Issy, is an interesting quarry in Upper and Middle Calcaire Grossier.

MEUDON.—Close to the railway, about half-a-mile north of Meudon, the Plastic Clay is again seen, together with the conglomerate formed of the *débris* of Chalk, Pisolitic Limestone, &c., containing *Gastornis*, *Coryphodon*, &c. On the south side of the road from Issy to Meudon, near Bas Meudon, the Lower Calcaire Grossier, the Plastic Clay, and the Pisolitic Limestone are again seen; the last mentioned resting unconformably on the Chalk.

* Dollfus and Vasseur, *Bull. Soc. Géol. de France*. 3e. sér., vol. vi. (1878), p. 243, &c

† From Dr. Hovelacque's notes.

GENTILLY AND ARCUEIL.—The quarries in the Calcaire Grossier at these localities have been referred to.* The Carrière Robine, near the Porte de Gentilly and the Carrières Lavenand, Nos. 1 and 2, are fine exposures. The latter quarry is close to Arcueil.

GRIGNON CENTRE.—(Nineteen miles W. of Paris.)

Leaving Paris and its immediate neighbourhood, one of the best centres for the fossils of the Calcaire Grossier is that of Grignon.

| <i>Localities.</i> | <i>Distance and Direction from Grignon.</i> | <i>Formation.</i> |
|------------------------------|---|----------------------|
| Grignon | ... | Calcaire Grossier. |
| Thiverval | 1 W. | " " |
| La Frileuse | 2 N.W. | " " |
| La Ferme de l'Orme | 4 $\frac{1}{2}$ W. | " " |
| Houdan | 10 W. | " " |
| Pontchartrain | 4 S.W. | Sables Supérieurs. |
| Montainville | 3 $\frac{1}{2}$ N.W. | Pisolitic Limestone. |

From Paris (Gare Montparnasse), take train to Plaisir-Grignon. There are two inns in the village; but if better accommodation is required, Versailles may be made the headquarters, though it is not so convenient.

GRIGNON.—The celebrated section at this village † is situated in the grounds of the École d'Agriculture, and permission is required from the Director of the school to examine the *coquillage*. At the school, the fine collection of Calcaire Grossier fossils should not be missed.

THIVERVAL.—The quarry at this place, just outside, and on the west of the Park of Grignon, is in Lower Calcaire Grossier, with *Venericardia planicosta*, and sharks' teeth.

LA FRILEUSE.—On the road to the farm of that name, about one mile from Thiverval, is a very small roadside section in Upper Calcaire Grossier; *Cerithium serratum*, *Conorbis lincolatus* and *Bayania lactea* are plentiful.

The high ground in this neighbourhood is generally capped with Upper Calcaire Grossier, and fossils may be obtained from several small exposures; *Mesalia fasciata* occurs, in varied forms, in the harder beds.

LA FERME DE L'ORME.—Take train or 'bus from Grignon to Neauphle-le-Château, and walk thence through Neauphle-le-Vieux, about 3 $\frac{1}{2}$ miles N.W., on the road to Septeuil, to the farm. There are two sections in the fields, and permission should be obtained from the proprietor to examine them. The Upper and Middle

* *Ante*, p. 20.

† See p. 22.

Calcaire Grossier are here exceedingly fossiliferous; a band of *Terebellum* is especially striking.

Note.—The Railway cutting near Villiers, on the way from Grignon to Neauphle, passes through a very fossiliferous portion of the Upper Calcaire Grossier.

MONTAINVILLE.—About five miles nearly due north of Neauphle-le-Château, the Pisolitic Limestone is exposed, with its characteristic fossils, mostly, however, in the form of casts. On the road to Montainville, Beynes is passed, which is interesting for its fossiliferous Chalk, here in a magnesian condition.

HOUDAN is a very rich locality for fossils of the Calcaire Grossier.

GISORS CENTRE.—(Thirty-nine miles N.W. of Paris.)

Leaving Grignon, it is best to return to Paris; and if the latter is to be re-visited, some trouble is saved by leaving the collected fossils in the dépôt for a few days. Take train from St. Lazare to Gisors, an excellent point from which to study some sections very rich in fossils. There is an inn opposite the station.

| <i>Localities.</i> | <i>Distance and Direction from Gisors.</i> | <i>Formation.</i> |
|--------------------------------|--|-----------------------|
| Chambors | 2½ S.E. | Calcaire Grossier. |
| Chaumont-en-Vexin | 4½ S.E. | " |
| Le Vivray | 5½ S.E. | " |
| Liancourt St. Pierre | 6½ S.E. | " |
| Vaudancourt | 3½ S. | " |
| Hérouval | 3½ S. | Sands of Soissonnais. |
| Montjavoult | 4½ S. | Sables Moyens. |
| Parnes | 6 S. | Calcaire Grossier. |
| Montagny | 5½ S. | Sables Moyens. |
| Magny | 8½ S. | St. Ouen Limestone. |
| Chaussy | 14 S. | Calcaire Grossier. |
| Le Fayel | 13½ S.E. | Sables Moyens. |
| Le Ruel | 13½ S.E. | " |
| Marines | 14 S.E. | " |

CHAMBORS.—Several large quarries in the Upper Calcaire Grossier.

CHAUMONT.—Large road-side section, very fossiliferous, in the Calcaire Grossier.

LE VIVRAY.—Large cutting at the side of the railway, yielding very fine fossils, *Turritella terebellata*, *Venericardia planicosta*, &c.

LIANCOURT.—Sand-pit near the road in Lower Calcaire Grossier, showing the conglomerate bed and junction with the *Sables de Cuise* in the lowest part, which is fossiliferous.

Note.—Practically the whole of the road from Chaumont to Liancourt presents a series of sections of the Calcaire Grossier, and all can be easily studied in one day.

HÉROUVAL.—Some road-side sand-pits in the sands of the Soissonnais yield a rich assemblage of fossils, as already stated.* They are small exposures and not easy to find.

MONTJAVOULT.—At the hamlet called Le Vouast, near a brickyard (the proprietor of which conducted us to the pit), is a good but small exposure of Sables Moyens with many fossils; *Potamides concavus* is abundant, colour-marking being preserved.

PARNES.—One of the richest Calcaire Grossier localities in the Paris basin. The sections are L'Aunaie, Beauves Farm, and Chaudry. *Cerithium spiratum* is one of the remarkable fossils of this locality, but it is rare.

CHAUSSY.—A rich locality for Calcaire Grossier fossils, reached by train to Fourges; the village is two and a-half miles east of the station.

LE RUEL.—Take train to Chars, walk through Neuilly-en-Vexin and Le Heaulme to Le Ruel. A sand-pit at a road corner, near the inn, has a rich assemblage of fossils, many species being identical with the Barton fauna. It is necessary to dig a trench for the best species; but the innkeeper will do this for a small sum. *Melongena minax* is very characteristic and good.

Of the other sections named it need only be said that they are all good and fossiliferous.

MOUCHY CENTRE.—(Thirty-four miles N. of Paris.)

From Gisors, possibly the next best centre is Mouchy, about thirty miles by rail from the former, passing through Beauvais; or Mouchy can be reached from Paris *viâ* Creil on the Chemin de Fer du Nord. Station, Heilles-Mouchy. Inn at Mouchy, two miles; or at Noailles, four and a-half miles from the station.

| Localities. | Distance and Direction from Mouchy. | Formation. |
|-----------------------------------|-------------------------------------|------------------------|
| Mouchy-le-Châtel | ... | Calcaire Grossier. |
| Noailles | 2 W. | Sables Inférieurs. |
| Mouy | 3½ E. | Calcaire Grossier. |
| St. Felix (Fay-sous-Bois) | 3½ N.E. | " |
| Ponchon | 3 N.W. | Calcaire Grossier, &c. |
| Ully-St.-Georges | 4 S. | " |
| Bracheux | 6 N.W. | Sables Inférieurs. |
| Abbecourt | 5½ N.W. | " |

Soon after leaving the station (Heilles-Mouchy) is a section on the left of the road in fossiliferous *Sables de Cuise*.

The Calcaire Grossier can be well studied at the points indicated; and the exposures are rich in fossils, those of Mouchy and Fay-sous-bois especially.

MOUCHY.—The section of Mouchy is on the road between Fercourt and Fayel, one mile south of Mouchy. It is only a few feet in height, on either side of the road, in very white Calcaire Grossier, exceedingly fossiliferous, with splendidly preserved specimens, many with colour markings.

MOUY.—On the same road towards Mouy, several sections occur in Middle and Upper Calcaire Grossier.

ST. FELIX (Fay-sous-Bois).—This exposure, about two miles to the north of Heilles-Mouchy station, is in very fossiliferous Calcaire Grossier.

PONCHON.—Showing fossiliferous sands at the base of the Calcaire Grossier, &c.

NOAILLES.—This section is close to the town, and is an important one, having produced some fine fossils. We were not rewarded in our searches, but stratigraphically the exposure is interesting.

BRACHEUX AND ABBECOURT.—Leave Heilles-Mouchy station for St. Sulpice, near Abbecourt, or walk from Mouchy on the road to Beauvais (about eight miles).

The typical fossiliferous locality of the sands of Bracheux is in a wood called Bois d'Épine, one mile north of Abbecourt. Two other sand-pits exist near Les Godins, half-a-mile north of St. Sulpice.

In the valley east of St. Sulpice, the Greensand, Gault and Chalk are met with, and on the hill slopes the Bracheux sands are found in pockets resting on the last mentioned formation.

MORTEFONTAINE CENTRE.—(Twenty-two miles N.E. of Paris.)

After studying the above-named sections, we have the choice of two routes, one east towards Soissons, and another south-east to Senlis and neighbourhood. The latter being nearer Paris, we will describe it first. The most central town for our purpose is Mortefontaine.

| <i>Localities.</i> | <i>Distance and Direction from Mortefontaine.</i> | <i>Formation.</i> |
|---------------------------------|---|-------------------|
| Mortefontaine | ... | Sables Moyens. |
| Le Guépelle | 4 S.W. | " |
| La Chapelle-en-Serval | 3 W. | " |
| Butte-aux-Clochettes | 2½ N. | " |
| St. Sulpice, near Ver | 2 E. | " |
| Ver | 4 E. | " |
| Ermenonville | 5 E. | " |
| Senlis | 7 N. | " &c. |

If approached from Paris, take train (Gare du Nord) to Survilliers, and omnibus from the latter to Mortefontaine where there is a fairly comfortable hotel.

MORTEFONTAINE.—The fossiliferous sand-pit is within half-a-mile north-west of the village.

LE GUÉPELLE.—This is one of the richest fossiliferous sections of the Sables Moyens in the Paris basin,* and is situated on the east side of the *route nationale* to Senlis, about one mile south of Survilliers station. There is no hamlet of the name, which is derived from a farm. The section is a large one, on the road-side, not far from an inn.

LA CHAPELLE-EN-SERVAL.—About one and a-half miles to the south-east of La Chapelle, in a wood, is the quarry, rich in Sables Moyens fossils, before referred to.†

BUTTE-AUX-CLOCHETTES.—Near the farm St. Marguerite, in the thick part of the wood Haute Chaume, is an exposure of the sandy and very fossiliferous Sables Moyens (upper horizon).

ST. SULPICE.—Near Ver. Some small exposures in the park are exceedingly fossiliferous. A farm labourer can be obtained to show the exact spot, which is not otherwise easily found.

VER.—This very fine section already described‡ has a rich assemblage of fossils.

ERMENONVILLE.—The Sables Moyens of this neighbourhood have furnished many fine species, and small exposures can occasionally be found in rabbit-burrows and ditches, especially on the right bank of the river Nonette, nearly opposite the tomb of Jean Jacques Rousseau.

SENLIS.—In the neighbourhood of this town several fossiliferous pits are open in the Sables Moyens and Calcaire Grossier.

PONT-SAINTE-MAXENCE, CUISE, SOISSONS, &c.

The next district to claim our attention is more extensive and its important exposures much scattered. It is, therefore, most convenient to make several stopping places.

PONT-SAINTE-MAXENCE.—(Thirty-four miles north-east of Paris.) May be reached from Survilliers (after studying the sections in the neighbourhood of Mortefontaine) or direct from Paris (Gare du Nord).

Here the Calcaire Grossier is, as already mentioned, dolomitic§ and is worked, among other places, at Minbertin, half-a-mile south of Pont-St.-Maxence. One mile north of the latter is

SARRON.—The Lignites of the Soissonnais are exposed half-a-mile north of the village, in a *ceudrière* close to the railway. There are two sections, both fossiliferous, with *Melania inquinata*, and other familiar Woolwich and Reading species.

Leaving Pont-Sainte-Maxence, take train *viâ* Compiègne to

* See detailed section, *ante*, p. 29.

† *Ante*, p. 28.

‡ *Ante*, p. 27.

§ *Ante*, p. 17.

Trosly-Breuil, and from the latter walk one and a-half miles south-east to

CUISE LA MOTTE.—(Forty-nine miles north-east of Paris.) There is a comfortable inn in the village. The celebrated and richly fossiliferous typical section* of the *Sables de Cuise* lies to the west, just outside the village.

At several points in the woods of Cuise, fossiliferous exposures of the *Sables de Cuise* and Lower Calcaire Grossier may be found.

From Cuise, excursions may be made towards the south to Pierrefonds and Morienvall, through some charmingly beautiful country; the Gorge du Han is especially fine with the distant view of Pierrefonds and its fine Château.

PIERREFONDS.—(Three miles south of Cuise.) Close to this town, on the road from Cuise at La Pisselotte, are two sections in fossiliferous *Sables de Cuise* and Lower Calcaire Grossier; and south of Pierrefonds (Gorge de Pierrefonds) is another section in *Sables de Cuise* with *têtes-de-chat*. Further south on the same road, at the farm of Bas Palesne is a section in Middle Calcaire Grossier, and at Haut Palesne a section in *Sables de Cuise* showing the passage into Lower Calcaire Grossier.

MORIENVAL is four and a-half miles south of Pierrefonds, and at several points are fossiliferous sections in *Sables de Cuise* and Calcaire Grossier—particularly at Fossemont, close to Morienvall.

Returning to Cuise and leaving from Trosly-Breuil, a halt may be made at

SOISSONS.—Close to this city, at St. Christophe, and at another section half-a-mile south of the latter, are exposures of the Lignites with *Ostrea bellovacensis*, *Corbicula cuneiformis*, and other characteristic fossils.

The sandstone of Belleu, a short distance south of Soissons, has furnished a fine flora from the upper part of the Lignites, but the quarries are now exhausted.

At Mercin, two miles west of Soissons, the Sands of the Soissonnais are fossiliferous and contain fine *Velates Schmideli*, &c.

The following centres from which the Eocene beds may be examined are suggestions only, as, with some exceptions, we have not personally visited the sections; but they are all important and characteristic localities, and many are referred to in the stratigraphical descriptions in the preceding pages.

* See description, p. 11.

LA FERTÉ-SOUS-JOUARRE CENTRE.—(Thirty-six miles E. of Paris.)

| <i>Localities.</i> | <i>Distance and Direction from La Ferté.</i> | <i>Formation.</i> |
|---------------------------------|--|------------------------|
| La Ferté-sous-Jouarre | ... | Sables Moyens. |
| Nanteuil-sur-Marne | 5½ N.E. | Limestone of St. Ouen. |
| Château-Thierry | 14 N.E. | Lignites, &c. |
| Brasles, near Château-Thierry | 15 N.E. | Calcaire Grossier. |
| Montmirail | 20 S.E. | " " |
| Tancrou | 6 N.W. | Sables Moyens. |
| Lisy-sur-Ourcq | 7 N.W. | " " |
| Vendrest | 7 N. | " " |
| Acy-en-Multjen | 13 N.W. | Calcaire Grossier. |
| Betz | 16 N.W. | Sables Moyens. |

The interesting sections in this portion of the Paris basin are somewhat scattered, and certain of the places cannot be reached by rail. Château Thierry, Brasles and Montmirail have stations, and some of the other places can be approached by rail to within a few miles. Tancrou and Lisy are within five miles of Changis station. Betz and Acy are within six miles of Nanteuil-le-Haudouin station, on the Paris-Soissons line.

ÉPERNAY CENTRE.—(Seventy-six miles E. of Paris.)

| <i>Localities.</i> | <i>Distance and Direction from Épernay.</i> | <i>Formation.</i> |
|--------------------------------------|---|----------------------|
| Épernay | ... | Lignites. |
| Bernon, near Épernay | ... | " |
| Les Rozières, near Épernay | ... | " |
| Cumières | 2½ N.W. | Calcaire Grossier. |
| Damery | 5 N.W. | " " |
| Fleury-la-Rivière | 6 N.W. | " " |
| Nanteuil-la-Fosse | 6 N. | " " |
| Courtagnon | 7 N. | " " |
| Sermiers | 8 N. | Lignites. |
| Chamery | 9 N. | Calcaire Grossier. |
| Germaine | 6 N.E. | St. Ouen Limestone. |
| Mt. Aimé, near Vertus | 13 S. | Pisolitic Limestone. |

The sections in the Lignites in the neighbourhood of Épernay contain such characteristic fossils as *Potamides funatus*, which is here variable in form. The Calcaire Grossier exposures are very rich in fossils, that at Damery especially so. The section is at the upper part of a deep ravine about one mile from the village. Damery is easily reached by train from Épernay.

The celebrated Mt. Aimé is situated within two miles of the Colligny station on the branch line from Épernay. The Pisolitic Limestone is worked in great galleries or caves.

RHEIMS CENTRE.—(Eighty-two miles N.E. of Paris.)

| <i>Localities.</i> | <i>Distance and Direction from Rheims.</i> | <i>Formation.</i> |
|------------------------------|--|-------------------------|
| Rheims | ... | St. Ouen Limestone, &c. |
| Cernay | 3 E. | Lignites. |
| Brimont | 6 N. | Sables Inférieurs. |
| Châlons-sur-Vesle | 6 N.W. | " " |
| Chenay | 5½ N.W. | " " |
| Toussicourt | 6 N.W. | " " |
| Jonchery-sur-Vesle | 10 W. | " " |
| Fismes | 16 W. | " " |
| Rilly-la-Montagne | 6 S. | Rilly Limestone. |

This is an excellent centre for the study of the Sables Inférieurs—Brimont, Châlons, Chenay and Jonchery being especially fossiliferous.

LAON CENTRE.—(Seventy-seven miles N.E. of Paris)

| <i>Localities.</i> | <i>Distance and Direction from Laon.</i> | <i>Formation.</i> |
|---------------------------------|--|--------------------|
| Laon | ... | Sables Inférieurs. |
| La Fère | 14 N.W. | Sands of La Fère. |
| Sinceny (or Sainceny) | 18 W. | Lignites. |
| Aizy | 6½ S.W. | Sables Inférieurs. |
| Urcel | 8 S. | Lignites. |

The sections are important; that of Aizy being the typical exposure of the lower horizon of the Sands of the Soissonnais. La Fère is also a classical locality; whilst Sainceny affords excellent outcrops* of the interesting series of deposits found between the Lignites and the Nummulitic Sands of the Soissonnais.

ÉTAMPES CENTRE.—(Thirty-one miles S. of Paris.)

| <i>Localities.</i> | <i>Distance and Direction from Étampes.</i> | <i>Formation.</i> |
|----------------------------|---|--------------------|
| Étampes | ... | Sables Supérieurs. |
| Étrechy | 4 N. | " " |
| Jeurre | 3 N. | " " |
| Morigny | 3 N.E. | " " |
| Pierrefitte | 2 W. | " " |
| Carrefour | 1½ W. | " " |
| Ormoy-la-Rivière | 2 S. | " " |
| Côte St. Martin | 1 S. | " " |

* *Ante*, p. 10.

The only real centre for studying the Oligocene beds of the Paris basin, in order to see both the palæontological and stratigraphical features, is Étampes.

Leave Paris (Chemin de Fer d'Orléans) for Étampes, where there are several inns. Train can be taken from Étampes to Étrechy, and the sections are found mostly on the walk back to Étampes. As the exposures are not very clear, we will describe their position fully. Just after passing the railway arch on the main road from Étrechy to Étampes on the right-hand side of the road is a trench about six feet deep for drainage purposes, and the characteristic fauna of this Étrechy section is seen, with *Brachytrema Boblayei*, &c. The section is much weathered and not easy to find.

About one and a-quarter miles from Étrechy, along the main road, on the right-hand side, is the classical *Sablère* of Jeurre already described.* Half-a-mile further on, towards Étampes, a farm road branches east to Ville-Martin farm. About a quarter-of-a-mile from this, to the south, in a coppice, is the section of Morigny, a few feet of sand among the roots of trees, full of *Potamides trochlearis*, *Bayania semidecussata* and *Potamides plicatus* and other fossils.

Another excursion can be made from Étampes to Pierrefitte, taking the bye-road from the former to Pierrefitte, keeping on the north bank of the river Challouette. The section is about a quarter-of-a-mile beyond Pierrefitte. Returning part of the way to Pierrefitte, strike south across the river to Carrefour, where there are two sections. About one and a-half miles over the railway, at the junction of two main roads, is the great quarry of Côte St. Martin.† Afterwards take the road due south to Ormoy la Rivière, about two miles from Côte St. Martin. The fossiliferous locality is on the top of the hill a short distance east of the village.

* *Ante*, p. 33.

† *Ante*, p. 43.

PALÆONTOLOGY OF THE EOCENE AND OLIGOCENE BEDS OF THE PARIS BASIN.

(Including a list of the Mollusca.)

Considered from their palæontological aspect, the Eocene and Oligocene beds of the Paris basin are of the highest possible interest to the student of almost every section of organic life, Vertebrata, Invertebrata, and Plantæ being well represented at different horizons, as we have already seen in dealing with the sub-divisions of the various formations. Within our present limits, it is impossible to do more than allude to the salient features of the varied faunas and floras presented to us, and no attempt will be made to deal exhaustively with the subject; with this exception, that a complete list of the molluscan fauna is appended, to which we shall hereafter more fully refer.

Taking the fossils in systematic order, we propose to give an outline of the leading features of each class, with references to the principal authorities on the respective subjects.

VERTEBRATA.

Mammalia.—Mammalian remains are very varied and abundant in some of the beds now under consideration, and they have been fully discussed by the following authors:—Cuvier*, De Blainville†, P. Gervais‡, Pictet§, Gaudry||. Amongst the characteristic mammalian remains, the following may be cited:—

| Order. | Genus. | Species. | Formation. |
|-----------------|----------------------|----------------------------|---------------|
| LEMUROIDEA. | <i>Adapis</i> | <i>parisiensis</i> , Cuv. | Gypsum. |
| CREODONTA: | <i>Pterodon</i> | <i>dasyuroides</i> , Gerv. | " |
| | <i>Hyænodon</i> | <i>parisiensis</i> , Laur. | " |
| | <i>Arctocyon</i> | <i>primævus</i> , Blain. | Sab. Inf. |
| CHIROPTERA. | <i>Vespertilio</i> | <i>parisiensis</i> . | Gypsum. |
| AMBLYPODA. | <i>Coryphodon</i> ¶ | <i>eoænicus</i> , Owen | Plastic Clay. |
| PERISSODACTYLA. | <i>Palæotherium</i> | <i>magnum</i> , Cuv. | Gypsum. |
| | " | <i>crassum</i> , Cuv. | " |
| | " | <i>medium</i> , Cuv. | " |
| | " | <i>minus</i> , Cuv. | " |
| | <i>Lophiodon</i> | <i>parisiensis</i> , Gerv. | Lignites, &c. |
| | <i>Pachynolophus</i> | <i>Prevosti</i> , Gerv. | Calc. Gross. |
| | " | <i>Duvali</i> , (Pomél) | " |
| ARTIODACTYLA. | <i>Chæropotamus</i> | <i>parisiensis</i> , Cuv. | Gypsum |
| | <i>Anoplotherium</i> | <i>commune</i> , Cuv. | " |
| | <i>Xiphodon</i> | <i>gracilis</i> , Cuv. | " |
| | <i>Dichobunus</i> | <i>leporinus</i> , Cuv. | " |
| SIRENIA. | <i>Halitherium</i> | (ribs & teeth). | Font. Sand. |
| CARNIVORA. | <i>Palæonictis</i> | <i>gigantea</i> , Blain. | Lignites. |

* Cuvier, *Recherch. sur Oss. foss.*, Paris (1812), and later editions.

† De Blainville, *Ostéo. des Mamm. réc. et foss.*, Paris (1839-1863).

‡ Gervais, *Zool. et Pal. françaises* (1859).

§ Pictet, *Traité de Paléont.*

|| Gaudry, *Enchain. du monde Anim.*, Paris (1878), &c.

" *Ancêtres de nos Animaux.*

¶ For an account of *Coryphodon* remains, see E. T. Newton, *Proc. Geol. Assoc.*, vol. viii. (1883), p. 250.

Aves.—The Paris basin has yielded several species of birds, though it is not so rich in this respect as the Miocene district of Allier (Central France), from which about seventy species have been recorded. The Meudon conglomerate has yielded *Gastornis parisiensis*, Hébert, and in the Gypseous beds of Montmartre Cuvier recognised the following species, chiefly by their foot-prints:—

| Family. | Genus. | Species. |
|-----------|---------------------|---------------------------|
| CARINATÆ. | <i>Palæorlyx</i> | <i>Hoffmanni</i> (Gerv.). |
| | <i>Circus</i> (?) | |
| | <i>Haliæetus</i> or | |
| | <i>Pandion</i> (?) | |
| | <i>Strix</i> (?) | |
| | <i>Sitta</i> (?) | <i>Cuvieri</i> , Gerv. |
| | <i>Coturnix</i> (?) | |
| | <i>Scolopax</i> (?) | |
| | <i>Pelidua</i> (?) | |
| | <i>Ardea</i> (?) | |
| | <i>Numenius</i> (?) | <i>gypsorum</i> , Gerv. |
| | <i>Pelecanus</i> . | |

Sir A. Geikie, F.R.S., summarises the bird fauna in the following words*: “From the Upper Eocene beds of the Paris basin, ten species of birds have been obtained, including forms allied to the buzzard, woodcock, quail, pelican, ibis, flamingo, and African hornbill.” More or less perfect fragments have been met with in the Sables Moyens and St. Ouen Marls.†

Reptilia.—Several species of Reptilia are met with in the Eocene and Oligocene beds of the basin; those most frequently occurring are the following:—

| Order. | Genus. | Species. | Formation. |
|-------------|---------------------|-------------------------------|------------------------|
| CROCODILIA. | <i>Diplocynodon</i> | <i>depressifrons</i> , Blain. | Plastic Clay, &c. |
| | ” | <i>obtusidens</i> , Pomel | <i>Sab. de Cuise</i> . |
| | ” | <i>Rollinati</i> , Gray | Sab. Moy. |
| OPHIDIA. | ” | <i>parisiensis</i> , Cuv. | Gypsum. |
| | <i>Palæophis</i> | <i>giganteus</i> , Pomel | Sds. of Soiss. |
| CHELONIA. | <i>Trionyx</i> | <i>parisiensis</i> , Meyer | Gypsum. |
| | ” | <i>granosus</i> , Pomel | <i>Sab. de Cuise</i> . |
| | ” | <i>vittatus</i> , ” | Plastic Clay, &c. |
| | ” | <i>lævigatus</i> , ” | <i>Sab. de Cuise</i> . |
| | <i>Emys</i> | <i>parisiensis</i> , Gray | Gypsum. |

Vertebræ of Reptilia have been found in the “*Faussees glaises*,” and impressions of *Chelonia* in the Gypsum. For more detailed information on the Reptilia, consult P. Gervais‡ and A. S. Woodward.§

* A. Geikie, “Text Book of Geol.” (1882), p. 84o.

† For further details consult Cuvier, *Oss. Foss.* Milne Edwards, *Oiseaux Foss. Franç.* Gervais, *Paléont. Franç.* Lydekker, *Catal. Brit. Mus.*

‡ P. Gervais, *Zoologie et Paléont. françaises*.

§ A. S. Woodward, “On Fossil Leathery Turtles,” in *Proc. Geol. Assoc.*, vol. x. (1887), p. 2, with full references to many writers on “Turtles.”

Pisces.—Fish remains are plentifully distributed throughout the Eocene beds, and some of the most important species may be enumerated :—

| Genus. | Species. | Formation. |
|-----------------------|-------------------------------|-----------------------|
| <i>Lepidosteus</i> | <i>suessioniensis</i> , Gerv. | Meudon Conglomerate. |
| <i>Carcharodon</i> | <i>auriculatus</i> , Blain. | Sands of Soissonnais. |
| " | <i>leptodon</i> , Agass. | " " |
| " | <i>sulcidens</i> , " | " " |
| <i>Cælorhynchus</i> | <i>rectum</i> , " | " " |
| <i>Chrysophrys</i> | <i>mitra</i> , " | " " |
| <i>Galeocерdo</i> (?) | <i>minor</i> , " | " " |
| <i>Lepidosteus</i> | <i>Maximiliani</i> , Agass. | " " |
| <i>Phyllodus</i> | <i>marginalis</i> , " | " " |
| " | <i>Duvali</i> , Pomel | " " |
| " | <i>inconstans</i> , " | " " |
| " | <i>latidens</i> , " | " " |
| " | <i>Levesquei</i> , " | " " |
| <i>Argus</i> | <i>serratus</i> , Gervais | " " |
| <i>Scarus</i> | <i>tetrodon</i> , Pomel | " " |
| <i>Lamna</i> | <i>macrota</i> (Agass.) | " " |
| <i>Otodus</i> | <i>obliquus</i> , Agass. | " " |
| <i>Oxyrhina</i> | <i>hastata</i> , " | " " |
| <i>Notidanus</i> | <i>primigenius</i> , Agass. | " " |
| <i>Odontaspis</i> | <i>acutissima</i> , " | " " |
| " | <i>contortidens</i> , " | " " |
| " | <i>elegans</i> , " | " " |
| <i>Squatina</i> | <i>Gravesi</i> , Pomel | " " |
| <i>Kaia</i> | <i>echinata</i> , " | " " |
| <i>Myliobatis</i> | <i>acutus</i> , Agass. | " " |
| " | <i>canaliculatus</i> , Agass. | " " |
| " | <i>toliapicus</i> , " | " " |
| <i>Hemirhynchus</i> | <i>Deshayesi</i> , " | Calcaire Grossier. |
| <i>Pristis</i> | <i>parisiensis</i> , Gerv. | " " |
| <i>Carcharodon</i> | <i>auriculatus</i> , Blain. | " " |
| <i>Acanthurus</i> | <i>Duvali</i> , Agass. | " " |
| <i>Zanclus</i> | <i>eocænus</i> , Gerv. | " " |
| <i>Labrax</i> | <i>major</i> , Agass. | " " |

Isolated teeth, vertebræ, and other remains are met with in the Meudon conglomerate, Lignites, Sables Moyens (Auvers), St. Ouen limestone; and very rarely in the Gypsum. Consult for details, Agassiz, *Rech. sur les Poiss. Foss.*, and P. Gervais, *Zool. et Paléont. françaises*.

MOLLUSCA.

Cephalopoda, *Pteropoda*, *Gastropoda*, *Scaphopoda* and *Pelecypoda* (= *Lamellibranchiata*) are all represented. A revised list of these, with notes on the nomenclature, is appended (p. 64).

ARTHROPODA.

Crustacea.—Claws of *Crustacea*, *Callianassa*, &c., are met with in the Gypsum, and remains are also found in the marls of the Oligocene beds. In the Sables Moyens several species occur, e.g.

Psammocarcinus Hericarti, Desm.

Callianassa macrodactyla, Edw.

Pagurus arenarius, Edw.

Psammograpsus parisiensis, Edw. &c.

Balanus also occurs in the Sands of Fontainebleau.

ECHINODERMATA.

Echinoidea.—In some of the beds now under consideration Echinoidea are exceedingly plentiful; e.g. the small genera, *Scutellina*, *Lenita*, &c., especially so in the Calcaire Grossier. It is impossible here to give a full list of species recorded; but some idea of their abundance will be formed when it is stated that the work of M. G. Cotteau,* now in the course of publication, already contains 260 8vo. plates, and the memoir is far from complete yet.

For a general table of the forms characteristic of different horizons consult E. Desor.†

A few of the principal forms met with are:—

| Family. | Genus. | Species. | Formation. |
|------------------|---------------------|----------------------------|--------------|
| ARBACIID.Æ. | <i>Cælopleurus</i> | <i>spinosissimus</i> , Ag. | Calc. Gröss. |
| EUCLYPEASTRID.Æ. | <i>Scutellina</i> | <i>lenticularis</i> , Lam. | " |
| | " | <i>elliptica</i> , Desm. | " |
| | " | <i>rotunda</i> , Galeot. | " |
| | " | <i>Hayesi</i> , Ag. | " |
| | <i>Lenita</i> | <i>patellaris</i> , Goldf. | " |
| CASSIDULID.Æ. | <i>Sismondia</i> | | |
| | <i>Echinocyamus</i> | <i>inflatus</i> , Defr.! | " |
| | <i>Echinolampas</i> | <i>excentrica</i> . | " |
| | " | <i>affinis</i> , Goldf. | " |
| SPATANGID.Æ. | <i>Pygorhynchus</i> | <i>grignonense</i> , Defr. | " |
| | <i>Eupatagus</i> | <i>Duvali</i> , Desor. | " |
| | <i>Schizaster</i> . | | |
| | <i>Hemiaster</i> . | | |

MOLLUSCOIDEA.‡

Brachiopoda.—It is remarkable that the Brachiopoda of the Paris basin are found almost entirely in the Calcaire Grossier, and, with the exception of *Terebratula bisinuata*, they are comparatively rare. The following list includes all the forms hitherto recorded:—

| Genus. | Species. | Formation. |
|----------------------|-------------------------------|--------------------|
| <i>Cistella</i> | <i>semicostata</i> , Baudon | Calcaire Grossier. |
| " | <i>Baudoni</i> , Desh. | " |
| " | <i>Bouryi</i> , De Morgan | Sables Moyens. |
| " | <i>Douvillei</i> , De Morgan | Calcaire Grossier. |
| " | <i>crassicostata</i> , Baudon | " |
| " | <i>aculeata</i> , Baudon | " |
| " | <i>Collardi</i> , Baudon | " |
| " | <i>Chevalieri</i> , Bayan | " |
| " | <i>puncticulata</i> , Desh. | " |
| <i>Terebratula</i> | <i>bisinuata</i> , Lam. | " |
| " | <i>Davidsoni</i> , Desh. | " |
| " | <i>tornacensis</i> , Vincent | Sables Inférieurs. |
| " | <i>Baudoni</i> , Desh. | Calcaire Grossier. |
| <i>Terebratulina</i> | <i>parisiensis</i> , Desh. | " |
| " | <i>tenuiplicata</i> , Desh. | " |
| " | <i>Pictoni</i> , Baudon | " |
| " | <i>semilineata</i> , Baudon | " |
| " | <i>squamulosa</i> , Baudon | " |
| <i>Kingena</i> | <i>Raincourti</i> , Deslong. | " |
| <i>Crania</i> | <i>eocænica</i> , De Rainc. | " |

* G. Cotteau, *Paléont. français, Echinides éocènes*, Paris (1885 to date).

† E. Desor, *Synopsis des Echinides foss.*, Paris and Wiesbaden (1858), pp. lxii., lxiv.

‡ This term is here retained purely as a matter of convenience, and not as implying either relationship with the Mollusca or inter-relationship between the Classes here grouped.

Bryozoa.*—Although not well represented in the area now under consideration, several species occur in the Sands of the Soissonnais and Calcaire Grossier. We may cite the following :—

| Genus. | Species. | Formation. |
|------------------|-------------------------------|--------------------|
| <i>Lunulites</i> | <i>radiatus</i> , Lam. | Calcaire Grossier. |
| " | <i>urceolatus</i> , " | " |
| <i>Discopora</i> | <i>grignonensis</i> , M. Edw. | " |
| <i>Idmonea</i> | <i>coronopus</i> , Defr. | " |

COELENTERATA.

Actinozoa.—The corals of the Paris basin are well preserved and plentiful, notably in the Sables Moyens at Auvers. Some of the characteristic forms are :—

| Family. | Genus. | Species. | Formation. |
|--------------|--------------------|---------------------------------------|---------------------|
| PORITIDÆ. | <i>Litharæa</i> | <i>parisiensis</i> , E.&H. | |
| | " | <i>crenulata</i> , Goldf. | Sab. Moy. |
| | " | <i>Deshayesi</i> , Mich. | " |
| MADREPORIDÆ. | <i>Madrepora</i> | <i>Solanderi</i> , Defr. | " |
| | " | <i>deformis</i> , Mich. | " |
| EUPSAMMIDÆ. | <i>Lobopsammia</i> | <i>cariosa</i> , Goldf. | " |
| | <i>Eupsammia</i> | <i>trochiformis</i> , Pallas. | Calc. Gross. |
| (?) FUNGIDÆ. | <i>Cyathoseris</i> | <i>infundibuliformis</i> , Blainv. | Sab. Moy. |
| ASTRÆIDÆ. | <i>Stylocænia</i> | <i>emaciata</i> , Lam. | " & Calc. Gross. |
| OCULINIDÆ. | <i>Diplohelix</i> | <i>ravistella</i> , Defr. | Calc. Gross. |
| TURBINOLIDÆ. | <i>Turbinolia</i> | <i>elliptica</i> , Lam. | " |

Consult Duncan, *Revision of Genera of Corals*, Journ. Lin. Soc. (1885).

Hydrozoa.—Among the earliest known forms of Millepore, *Axopora Solanderi*, Def., may be quoted as occurring in the Sables Moyens, particularly at Auvers.

PROTOZOA.

Foraminifera.—These are exceedingly numerous and well-developed, and of considerable importance, as we have already seen, in assisting to classify the beds of the Paris basin. Their value in this respect is better recognised, when we bear in mind the fact that the "Nummulitic formations" occupy very large areas in other parts of Europe and Asia. Some of the leading genera occurring are *Orbitolites*, *Nummulites*, *Alveolina*, *Miliola* (including Bi-, Tri-, and Quinque-loculine forms). The abundant material has not been worked out fully, but the following authors should be consulted : D'Archiac, † Lamarck, ‡ Terquem. §

* On the Bryozoa consult, Milne Edwards, *Rech. sur les Polyptiers foss.*, Ann. Sci. Nat. (1836), &c.; and H. Michelin, *Iconographie Zoophytologique*, Paris (1840-47).

† D'Archiac; Many papers in *Mém. Géol. Soc. France*, and *Bull. Soc. Géol. Fr.* (1835-1868).

‡ Lamarck, *Ann. du Mus.*, Paris (1804, 1806, 1807).

§ Terquem, *Les Foraminifères de l'Éocène des Env. de Paris*; *Mém. Soc. Géol. Fr.* 3e. sér., t. ii. (1832), Paris.

The last mentioned paper is very full of information, describing the species on the plates 101-106 in Deshayes' *Coquilles Fossiles des Environs de Paris*, which were only figured in that work, without descriptions. The Oligocene Nummulites are discussed by R. Tournouër,* and the Rhizopoda of the Lower Calcaire Grossier by Berthelin†. Certain genera, as *Ovulites*, which have been referred to the Foraminifera are now regarded as Calcareous Algæ, and we shall refer to them later on.

PLANTÆ.

THE plant remains of the Paris basin are plentiful on certain horizons and enable us to draw some interesting parallels with the floras of the English beds. The Pisolitic Limestone of Mont Aimé has yielded such genera as *Marchantia*, *Asplenium*, *Aspidium*, &c.‡ The Sézanne limestone (*Butte des Crottes*) contains an extremely rich flora which has been classified by the Marquis de Saporta§—eighty-six species having been described. Some of the more important genera cited are, *Asplenium*, *Myrica*, *Dryophyllum*, *Sassafras*, *Cyssus*, *Magnolia*, *Juglans*. The affinities of this group are Cretaceous and distantly related to those of Ardtun (Isle of Mull). The Bracheux Sands, although not of such botanical importance as the Sézanne beds, have yielded an interesting flora which has been described by Watelet.|| Stanislas Meunier¶ summarises the flora of this horizon in the following words: "Appearance in the sands of Bracheux of some families of *Monocotyledons*; disappearance of the family *Cycadæ*; appearance of *Moreæ*, of *Platanaceæ*, and of *Proteaceæ*; complete absence of *Monopetalæ*; commencement of *Polypetalæ*." The sandstone of Belleu contained well-preserved plant-remains; but the quarries are now exhausted. The flora has many species in common with that of the Lower Bagshot of Alum Bay, such species as *Ficus Bowerbanki*, *Laurus* (?) *Salteri*, *Cinnamomum Larteti*, *Quercus eocenica*, *Dryandra*, &c., are characteristic.** The Soissonais Sands have yielded another rich and interesting flora, including palms, as *Endogenites echinatus*; many other genera are recorded by Watelet.††

The Calcaire Grossier flora is to a certain extent homotaxial with that of the Bournemouth beds. The Banc Royal contains

* Tournouër, *Bull. Soc. Géol. de France*, 2e. sér., t. xxvi. pp. 974-982, Paris (1869).

† Berthelin, *Coupe d'œil sur la Faune Rhizobodique du Calc. Gross. Inf. d. la Marne*, *Bull. Soc. française pour l'avanc. des Sci.* (1880), p. 553. For full bibliography consult, *A Bibliography of the Foram.*, C. D. Sherborn, London (1888), and for works on French Rhizopoda, *The Bibliography of the Foram.*, A. Woodward, *Geol. & Nat. Hist. Surv. of Minnesota*, S. Paul, Minn. (1886), p. 234.

‡ Pomel, *Suppl. à la Bib. de Genève. Arch. des Sci. Phy. et Nat.* (1847), t. v.; p. 301.

§ Saporta, *Mém. Soc. Géol. Fr.*, 2e. sér. (1868), t. viii., p. 289.

|| Watelet, *Desc. des plantes foss. du Bass. de Paris* (1866), p. 253.

¶ S. Meunier, *Géol. des Env. de Paris*, Paris (1875), p. 136.

** E. Fallot, *Ann. Géol. Univ.*, t. v. (1888), p. 454.

†† Watelet, *op. cit.*, p. 255.

Caulinites associated with *Flabellaria*, *Equisetum*, *Zostera*, &c.* The St. Ouen and Beauce Limestones have each a flora with fresh-water characters, *Chara medicaginula* and the *débris* of other vegetation often being met with. Other plant remains, more or less perfect, are found at different horizons in the Paris Tertiaries, as in the Brie Limestone; but the most important series have been mentioned. Some minute fossils, met with in great profusion, notably in the Calcaire Grossier (*Ovulites*, *Dactylopora*, &c.), and referred to the Foraminifera by many authors, have been more recently classed among the Calcareous Algæ by Munier-Chalmas† and Solms-Laubach.‡

INTRODUCTION TO THE TABLES OF MOLLUSCA.

The list of EOCENE Mollusca in the first table which follows is based on the admirable "Catalogue Illustré des Coquilles Fossiles de l'Éocène des Environs de Paris," Bruxelles, 1886-1889, by M. Cossmann, of which four fasciculi have already appeared, comprising the Pelecypoda, Scaphopoda and Gastropoda. We have found it necessary to revise that catalogue to some extent, and our remarks on the subject will be seen on p. 110. In the table several contractions are used. Thus:—

- U.E. (Upper Eocene) = The Sables Moyens, St. Ouen Limestone and Gypsum beds.
 M.E. (Middle Eocene) = The Calcaire Grossier.
 L.E. (Lower Eocene) = The Sands of Aizy and Cuise.
 L.L.E. (Lowest Eocene) = The Sands of Bracheux, Limestone of Rilly and Lignites.

The list of OLIGOCENE Mollusca in the second table is mainly based on the work of MM. Cossmann and Lambert, "Mém. Soc. Géol. France," 3e sér. t. iii. (1884), pp. 1, *et seq.* But we have brought the nomenclature of the majority of the genera and species mentioned, up to date, and are much indebted to M. Cossmann for assistance in this matter. The numbers at the head of the columns of the Oligocene table refer to the beds as indicated in the classification on p. 35. The letters in the column on the extreme right of the table refer to localities in the Paris basin, but outside the typical Oligocene area of Étampes. Thus c means Château Landon, e Essonnes, f Frépillon, l Longjumeau, m Montmorency, n Neuilly, o Orsay, p Palaiseau, r Romainville, s Sceaux, v Versailles, and vil Villepreux. C. DE BE means Limestone of Beauce, and M. SUP Meulières Supérieurs.

**id.* p. 256.

† Mun. Chalmas *Obs. sur les algues calcaï-es. Comptes rendus*, t. lxxxv. (1877), p. 814; *Obs. sur les algues calcaï-res, Bull. Soc. Géol. Fr.*, 3e sér., t. vii. (1879), p. 354, 661, figures.

‡ Solms-Laubach, *Einleitung in die Paläophytologie*, Leipsic (1887). For further details on the floras of the Paris Basin consult Watelet, *Desc. des plantes foss. du Bass. de Paris*, Paris (1866). Schimper, *Paléontologie végétale*, Paris, London, and Madrid (1870-72), 3 vols., and atlas of plates. Saporta, *Flore fossile de Sézanne, Mém. Soc. Géol. Fr.*, Paris (1865-81); P. Gervais, *Zool. et Pal. franç.* (1859); De Blainville, *Osteographie. &c.*, Paris (1839-63), with atlas of plates.

| a | b | c | d |
|--|---|---|---|
| " <i>vermicularis</i> , Desh. | | | |
| " <i>modica</i> , Desh. | * | | |
| <i>Teredia personata</i> , Lam. | * | | |
| " <i>Owenti</i> , Desh. | * | | |
| " <i>Barnes Levesquei</i> (Wat.) | * | | |
| <i>Aspidopholas affinis</i> (Desh.) | * | * | * |
| " <i>scutata</i> (Desh.) | * | * | * |
| <i>Martesia elegans</i> (Desh.) | * | * | * |
| " <i>Baudoni</i> (Desh.) | * | * | * |
| " <i>aperta</i> (Desh.) | * | * | * |
| " <i>proxima</i> (Desh.) | * | * | * |
| " <i>conoides</i> (Desh.) | * | * | * |
| " (<i>Heteropholas xylophagna</i> (Desh.) | * | * | * |
| <i>Jouannetia Dutemplei</i> (Desh.) | * | * | * |
| " <i>Theussoniae</i> , Rainc. & M. C. | | | |
| " <i>Morleti</i> , Coss. | | | |
| <i>Solen proximus</i> , Desh. | * | * | * |
| " <i>angustus</i> (Desh.) | * | * | * |
| " <i>gracilis</i> , Sow. | * | * | * |
| " <i>vaginalis</i> (Desh.) | * | * | * |
| " (<i>Solena</i> ?) <i>plagiolaris</i> , Coss. | | | |
| " <i>lavernensis</i> , Lef. & Wat. | | | |
| <i>Enciculus cladarus</i> (Bayan) | | | |
| <i>Cultellus grignonensis</i> , Desh. | * | * | * |
| " <i>cyphus</i> , Coss. | | | |
| " <i>Brongniartii</i> , Desh. | * | * | * |
| <i>Solenocurtus Deshayesi</i> , Desm. | | | |
| <i>Siliqua Lamarcki</i> , Desh. | * | * | * |
| " <i>berallensis</i> , Laub. & Carez | | | |
| " <i>Lanvrierei</i> , Coss. | * | * | * |
| " <i>papyracea</i> (Desh.) | * | * | * |
| " <i>angusta</i> , Desh. | * | * | * |
| " <i>cuneiformis</i> , Desh. | | | |
| " <i>donaciformis</i> , Desh. | | | |
| " <i>niliens</i> , Bayan | * | * | * |
| " <i>rostrata</i> (Lam.) | * | * | * |
| " <i>angusta</i> , Desh. | * | * | * |
| (?) <i>cyrenoides</i> , Coss. | * | * | * |
| <i>Corbulonys subcomplanata</i> . D'Orb. | | | |
| " <i>Chevallieri</i> , Desh. | | | |
| " <i>pulvis</i> , Desh. | | | |
| " <i>seminulum</i> , Desh. | * | * | * |
| " <i>antiqua</i> , Desh. | * | * | * |
| " <i>Nysii</i> , Desh. | * | * | * |
| <i>Corbula anatina</i> , Lam. | * | * | * |
| " <i>Lamarcki</i> , Desh. | * | * | * |
| " <i>striatula</i> , Desh. | * | * | * |
| " <i>pixidicula</i> , Desh. | * | * | * |
| " <i>ampullacea</i> , Desh. | * | * | * |
| " <i>costata</i> , Sow. | * | * | * |
| " <i>rugosa</i> , Lam. | * | * | * |
| " <i>ficus</i> , (Sol.) | * | * | * |
| " <i>regulibensis</i> , Morris | * | * | * |
| " <i>obliquata</i> , Desh. | * | * | * |
| " (<i>Bicorbula</i>) <i>exarata</i> , Desh. | | | |
| " <i>gallica</i> , Lam. | * | * | * |
| " <i>gallucula</i> , D' sh. | | | |
| " <i>Bourryi</i> , Coss. | * | * | * |
| " <i>areolifera</i> , Coss. | * | * | * |
| " (<i>Agina</i>) <i>pisum</i> , Sow. | * | * | * |
| " <i>subpisum</i> , D'Orb. | * | * | * |
| " <i>pseudopisum</i> , Doll. | | | |
| " <i>Arnouldi</i> , Nyst | * | * | * |
| " <i>muricina</i> , Levesq. | | | |
| " <i>Thracia Prestwichi</i> , Desh. | | | |
| " <i>Eduardsi</i> , Desh. | * | * | * |
| " <i>Ludovici</i> , Desh. | * | * | * |
| " <i>grignonensis</i> , Desh. | * | * | * |
| " <i>parvula</i> , Desh. | * | * | * |
| " <i>microscopica</i> , Coss. | * | * | * |
| " <i>halitus</i> , Coss. | * | * | * |
| <i>Neeroporomyia argentea</i> (Lam.) | | | |
| <i>Endomargarita Heberti</i> (Desh.) | | | |
| <i>Pholadomyia cuneata</i> , Sow. | * | * | * |
| " <i>Konnicki</i> , Nyst | * | * | * |
| " <i>virgulosa</i> , Sow. | * | * | * |
| " <i>ludensis</i> , Desh. | * | * | * |
| <i>Mactra semisulcata</i> , Lam. | * | * | * |
| " <i>Levesquei</i> , D'Orb. | * | * | * |
| " <i>contortula</i> , Desh. | * | * | * |
| " <i>Lamberti</i> , Desh. | * | * | * |
| " <i>Loustaica</i> , Bayan | * | * | * |
| " <i>suessoniensis</i> , Wat. | * | * | * |
| " <i>compressa</i> , Desh. | * | * | * |
| " <i>recondita</i> , Desh. | * | * | * |
| " <i>parameces</i> , Coss. | * | * | * |
| " <i>Bernayi</i> , Coss. | * | * | * |
| <i>Carditia Michelini</i> , Desh. | * | * | * |
| <i>Synedusya Lamberti</i> , Desh. | * | * | * |
| " <i>Recluzi</i> , Desh. | * | * | * |
| " <i>suessoniensis</i> , Desh. | | | |
| " <i>exilis</i> , Desh. | * | * | * |
| " <i>media</i> , Desh. | * | * | * |
| " <i>obtusata</i> , Desh. | * | * | * |
| " <i>difficilis</i> , Desh. | * | * | * |
| " <i>deltoidea</i> , Desh. | * | * | * |

| | a | b | c | d |
|---|---|---|---|---|
| " <i>strongyla</i> , Coss. | | | | |
| " <i>donacialis</i> , Lam. | | | | |
| " <i>Verneuili</i> , Desh. | | | | |
| " <i>parilis</i> , Desh. | | | | |
| " <i>Sellei</i> , Coss. | | | | |
| " <i>elegans</i> , Desh. | | | | |
| " <i>erycinoides</i> , Desh. | | | | |
| " <i>patellaris</i> , Lam. | | * | | |
| " (<i>Macaliopsis</i>) <i>Barrandti</i> , Desh. | | | | |
| " <i>craticulata</i> , Edw. | | | | |
| " <i>scalaroides</i> , Lam. | | | | |
| " <i>biangularis</i> , Desh. | | | | |
| " <i>rudrata</i> , Desh. | | * | | |
| " <i>corbissoides</i> , Cail. | | | | |
| " <i>fayellensis</i> , Coss. | | | | |
| " <i>hybrida</i> , Desh. | | * | | |
| " <i>id nea</i> , Desh. | | * | | |
| " <i>tenuistriata</i> , Desh. | | | | |
| " <i>striatissima</i> , Desh. | | | | |
| " <i>minima</i> , Desh. | | | | |
| " <i>denuadata</i> , Desh. | | * | | |
| " <i>eurymorpha</i> , Coss. | | * | | |
| " (<i>Cyclotellina</i>) <i>lamellosa</i> , Desh. | | | | |
| " <i>lanulata</i> (Lam.) | | | | |
| " <i>progressa</i> , Wat. | | * | | |
| " <i>subelegans</i> , D'Orb. | | * | | |
| " (<i>Arcopagiopsis</i>) <i>pustula</i> , Desh. | | | | |
| " <i>distans</i> , Desh. | | | | |
| " <i>sublenuistriata</i> , D'Orb. | | | | |
| " <i>Arcopagia stenochora</i> , Coss. | | | | |
| " <i>cuisensis</i> , Coss. | | | | |
| " <i>Psammodonax Caillati</i> (Desh.) | | | | |
| " <i>donacinus</i> (Desh.) | | * | | |
| " <i>spathulus</i> (Desh.) | | * | | |
| " <i>Vaudini</i> (Desh.) | | | | |
| " <i>obtusatis</i> (Desh.) | | * | | |
| " <i>Herouvalia minima</i> (Desh.) | | | | |
| " <i>mediumbonata</i> (Coss.) | | * | | |
| " <i>semitexta</i> (Coss.) | | * | | |
| " <i>Donax auversensis</i> , Desh. | | | | |
| " <i>Foucardi</i> , Desh. | | * | | |
| " <i>parisiensis</i> , Desh. | | | | |
| " <i>retusus</i> , Lam. | | | | |
| " <i>acuminensis</i> , Coss. | | | | |
| " <i>Basteroti</i> , Desh. | | | | |
| " <i>incertus</i> , Desh. | | | | |
| " <i>cycloides</i> , Coss. | | * | | |
| " <i>sublavis</i> , Wat. | | | | |
| " <i>incompletus</i> , Lam. | | | | |
| " <i>trigonulus</i> , Desh. | | | | |
| " <i>tuvitulus</i> , Desh. | | | | |
| " <i>lanceolatus</i> , Desh. | | | | |
| " <i>acutatus</i> , Desh. | | | | |
| " <i>oncodes</i> , Coss. | | * | | |
| " <i>Egerella nitida</i> (Lam.) | | | | |
| " <i>Tapes tenuis</i> , Desh. | | * | | |
| " <i>parisiensis</i> , Desh. | | | | |
| " <i>Veneritapes Bervillei</i> (Desh.) | | | | |
| " <i>Venus</i> | | | | |
| " (<i>Venerella</i>) <i>hermonvillensis</i> (Desh.) | | | | |
| " <i>striatula</i> (Desh.) | | * | | |
| " <i>oblonga</i> (Desh.) | | | | |
| " (<i>Callista</i>) <i>larvigata</i> (Lam.) | | | | |
| " <i>proxima</i> (Desh.) | | * | | |
| " <i>Heberti</i> (Desh.) | | * | | |
| " <i>suberycinoides</i> (Desh.) | | * | | |
| " <i>scincifilla</i> (Desh.) | | * | | |
| " (<i>Pitar</i>) <i>sulcataria</i> (Desh.) | | * | | |
| " <i>parisiensis</i> (Desh.) | | * | | |
| " <i>ambigua</i> (Desh.) | | * | | |
| " <i>obliqua</i> (Desh.) | | * | | |
| " <i>avia</i> (Desh.) | | * | | |
| " <i>Lamberti</i> (Desh.) | | * | | |
| " <i>obsoleta</i> (De-h.) | | * | | |
| " <i>capillacea</i> (Desh.) | | * | | |
| " <i>globulosa</i> (Desh.) | | * | | |
| " <i>carvimontensis</i> (De-h.) | | * | | |
| " <i>corbulina</i> (Lam.) | | * | | |
| " <i>fastidiosa</i> (Desh.) | | * | | |
| " (<i>Chionella</i>) <i>ovalina</i> (Desh.) | | * | | |
| " <i>distincta</i> (Desh.) | | * | | |
| " <i>lunularia</i> (Desh.) | | * | | |
| " (<i>Tivolina</i>) <i>tellinaria</i> (Lam.) | | * | | |
| " <i>rustica</i> (Desh.) | | * | | |
| " <i>Vincenti</i> (Coss.) | | * | | |
| " <i>anuloga</i> (Desh.) | | * | | |
| " <i>striatula</i> (Desh.) | | * | | |
| " <i>Baudoni</i> (Coss.) | | * | | |
| " <i>gibbosula</i> (Desh.) | | * | | |
| " <i>humerosa</i> (Desh.) | | * | | |
| " <i>Dixonii</i> (Desh.) | | * | | |
| " <i>sphenarium</i> (Bayan) | | * | | |
| " <i>delloidea</i> (Lam.) | | * | | |
| " <i>capsuloides</i> (Coss.) | | * | | |
| " <i>mucooides</i> (Coss.) | | * | | |

| 7. PELECYPODA. | | L.L.E. | L.E. | M.E. | U.E. | 8. PELECYPODA. | | L.L.E. | L.E. | M.E. | U.E. | 9. PELECYPODA. | | L.L.E. | L.E. | M.E. | U.E. |
|---|--|--------|------|------|------|--|---|----------|----------|----------|----------|--|----------|----------|----------|----------|------|
| [<i>Meretrix</i>] | | | | | | <i>Sphaerium Boissyi</i> (Desh.) ... | * | | | | | [<i>Cardium</i>] | | | | | |
| " (<i>Trochena</i>) <i>distans</i> (Desh.) ... | | | | | | " <i>Verneuli</i> (De Boissy) ... | * | | | | | " (<i>Trachycardium</i>) <i>Bourryi</i> , Coss. ... | | | | * | |
| " " <i>elegans</i> (Lam.) ... | | | | * | | " <i>rilyense</i> (De Boissy) ... | * | | | | | " " <i>gratum</i> , Defr. ... | | | | * | |
| " " <i>elegantula</i> (Desh.) ... | | | | * | | " <i>Maussoneti</i> , De Laub. ... | * | | | | | " " <i>stiponaulax</i> , Coss. ... | | | | * | |
| <i>Sinetta</i> <i>trigonula</i> (Desh.) ... | | * | | * | | " <i>Laubrieri</i> , Coss. ... | * | | | | | " " <i>asperulum</i> , Lam. ... | * | | | * | |
| " " <i>polita</i> (Lam.) ... | | * | | * | | " <i>ellipsoidale</i> , Coss. ... | * | | | | | " " <i>verrucosum</i> , Desh. ... | * | | | * | |
| " <i>semisulcata</i> (Lam.) ... | | * | | * | | " <i>berillense</i> (De Laub. and Carez) ... | * | | * | | | " (<i>Plagiocardium</i>) <i>granulo-</i> <i>sium</i> , Lam. ... | | | | * | |
| " <i>Dosiniopsis fallax</i> (Desh.) ... | | * | | * | | " (<i>Eupera</i>) <i>lervigatum</i> , Desh. ... | * | | | | | " " <i>Passyi</i> , Desh. ... | | | | * | |
| " <i>bellovacensis</i> (Desh.) ... | | * | | * | | " " <i>Denainvilliersi</i> (De Boissy) ... | * | | | | | " " <i>cosmetum</i> , Coss. ... | | | | * | |
| " <i>Circe vetula</i> (Desh.) ... | | * | | * | | " " <i>Trapezium parisiense</i> (Desh.) ... | * | | | | | " " <i>Lovesquei</i> , D'Orb. ... | | | | * | |
| " <i>pusilla</i> (Desh.) ... | | * | | * | | " <i>Caillati</i> (Desh.) ... | * | | * | | | " " <i>convexum</i> , Desh. ... | * | | | * | |
| " <i>circularis</i> (Desh.) ... | | * | | * | | " <i>Coralliophaga grignonensis</i> (Desh.) ... | * | | | | | " " <i>Bourdoti</i> , Coss. ... | * | | | * | |
| " <i>Goodalliotides</i> , Coss. ... | | * | | * | | " " <i>irregularis</i> (Desh.) ... | * | | | | | " " <i>plagiomorphum</i> , Coss. ... | * | | | * | |
| " <i>Clémentia Deshayesi</i> , Coss. ... | | * | | * | | " " <i>obducta</i> (Desh.) ... | * | | | | | " " <i>fugax</i> , Coss. ... | * | | | * | |
| " <i>Dollfusia crassa</i> , Coss. ... | | * | | * | | " " <i>silicula</i> (Desh.) ... | * | | | | | " " <i>triangulatum</i> , De Laub. Desh. ... | * | | | * | |
| " <i>Psathura fragilis</i> (Lam.) ... | | * | | * | | " " <i>elegans</i> (Desh.) ... | * | | | | | " (<i>Loxocardium</i>) <i>formosum</i> , Desh. ... | * | | | * | |
| " <i>Cyrena nobilis</i> , Desh. ... | | * | | * | | " " <i>pulchra</i> (Desh.) ... | * | | | | | " " <i>sublima</i> , D'Orb. ... | * | | | * | |
| " " <i>luciniiformis</i> , De Laub. and Carez. ... | | * | | * | | " " <i>Chevallieri</i> (Desh.) ... | * | | | | | " " <i>multisquamatum</i> , Desh. ... | * | | | * | |
| " " <i>abbreviata</i> , Desh. ... | | * | | * | | " " <i>charitacea</i> , Bayan ... | * | | | | | " " <i>obliquum</i> , Lam. ... | * | | | * | |
| " " <i>incompta</i> , Desh. ... | | * | | * | | " " <i>modiolina</i> (Desh.) ... | * | | | | | " " <i>impeditum</i> , Desh. ... | * | | | * | |
| " " <i>distincta</i> , Desh. ... | | * | | * | | " " <i>ragionoides</i> (Desh.) ... | * | | | | | " " <i>patruelinum</i> , Desh. ... | * | | | * | |
| " " <i>compressa</i> , Desh. ... | | * | | * | | " " <i>Modiolarca dilatata</i> (Desh.) ... | * | | | | | " " <i>ingratum</i> , Desh. ... | * | | | * | |
| " <i>Dutemplei</i> , Desh. ... | | * | | * | | " <i>translucida</i> , Coss. ... | * | | | | | " " <i>Morleti</i> , De Rainc. ... | * | | | * | |
| " <i>Lamberti</i> , Desh. ... | | * | | * | | " <i>Basterotia</i> ... | * | | | | | " " <i>Papyrula capsoides</i> (Bayan) ... | * | | | * | |
| " <i>saincenyensis</i> , Desh. ... | | * | | * | | | | <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | | <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | |

| | a | b | c | d |
|---|---|---|---|---|
| " <i>linulata</i> , Desh. | * | | | |
| " (<i>Isodoma</i>) <i>amygdalina</i> , Desh. | * | * | * | * |
| " <i>tetragona</i> , Desh. | * | * | * | * |
| " <i>Chevallieri</i> , Coss. | | | * | * |
| " <i>cyrenoides</i> (Desh.) | | * | * | * |
| " (<i>Donacopsis</i>) <i>acutangularis</i> , Desh. | * | * | * | * |
| " <i>Heberti</i> , Desh. | * | | | |
| <i>Corbicula</i> <i>Lemouinei</i> , Bayan | * | | | |
| " <i>Gravesi</i> (Desh.) | * | | | |
| " <i>cardioides</i> (Desh.) | * | | | |
| " <i>veneriformis</i> (Desh.) | * | | | |
| " <i>roboreta</i> (Desh.) | * | | | |
| " <i>crassa</i> (Desh.) | * | | | |
| " <i>Forbesi</i> (Desh.) | * | | | |
| " <i>antiqua</i> (Fér.) | * | | | |
| " <i>cuneiformis</i> (Fér.) | * | | | |
| " <i>deperdita</i> (Desh.) | * | | | |
| " <i>planulata</i> (Desh.) | * | | | |
| " <i>unionif rnis</i> (Desh.) | * | | | |
| " <i>cycladiformis</i> (Desh.) | * | | | |
| " <i>rugifera</i> (Coss.) | * | | | |
| " <i>obliqua</i> (Desh.) | * | | | |
| " <i>fabulina</i> (Desh.) | * | | | |
| " <i>telinella</i> (Fér.) | * | | | |
| " <i>minuta</i> (Desh.) | * | | | |
| " <i>angusta</i> (Desh.) | * | | | |
| " <i>difficilis</i> (Desh.) | * | | | |
| " <i>angustidens</i> (Mell.) | * | | | |
| " <i>Arnouldi</i> (Michaud) | * | | | |
| <i>Plesiastarte</i> <i>crenulata</i> (Desh.) | * | | | |
| <i>Velorita</i> <i>imbricata</i> , Coss. | * | | | |
| " (<i>Anisodonta</i>) <i>complanata</i> (Desh.) | * | | | |
| " <i>rugosula</i> (Desh.) | | | * | * |
| " <i>depressuscula</i> (Coss.) | | | * | * |
| " <i>trigonula</i> (Coss.) | | * | * | * |
| " <i>ambigua</i> (Desh.) | | * | * | * |
| " (<i>Fulvella</i>) <i>edentula</i> (Desh.) | | * | * | * |
| " <i>sphaericula</i> (Coss.) | | * | * | * |
| " (?) <i>oncoides</i> (Coss.) | | * | * | * |
| " <i>sulcatina</i> (Coss.) | | * | * | * |
| " <i>irregularis</i> (Desh.) | | * | * | * |
| " <i>Baudoni</i> (Desh.) | | * | * | * |
| " <i>Foixesti</i> (Desh.) | | * | * | * |
| " <i>paradoxa</i> (Desh.) | | * | * | * |
| " <i>antiqua</i> (Desh.) | | * | * | * |
| <i>Anisocardia</i> <i>pectinifera</i> (Sow.) | | * | * | * |
| " <i>eocarnica</i> , Bayan | | * | * | * |
| " <i>isocardoides</i> (Desh.) | | * | * | * |
| " <i>carinata</i> (Desh.) | | * | * | * |
| " <i>Loustaui</i> , Coss. | | * | * | * |
| " <i>subquadrata</i> , Coss. | | * | * | * |
| " <i>tapina</i> , Coss. | | * | * | * |
| " (?) <i>chonoides</i> , Coss. | | * | * | * |
| <i>Glossus</i> <i>eocanicus</i> (De Rainc.) | | * | * | * |
| <i>Arctica</i> <i>scutellaria</i> (Desh.) | | * | * | * |
| " <i>hutulata</i> (Desh.) | | * | * | * |
| <i>Cardium</i> <i>Bazini</i> , Desh. | | * | * | * |
| " (<i>Trachycardium</i>) <i>gigas</i> , Defr. | | * | * | * |
| " <i>hybridum</i> , Desh. | | * | * | * |
| " <i>porulosum</i> , Sol. | | * | * | * |
| " <i>subporulosum</i> , D'Orb. | | * | * | * |
| " <i>trifidum</i> , Desh. | | * | * | * |
| <i>Dicors</i> <i>parisiensis</i> (D'Orb.) | | | | * |
| " <i>subdiscors</i> (D'Orb.) | | | | * |
| <i>Protocardia</i> <i>Wateleti</i> (Desh.) | | | | * |
| " <i>Edwardsi</i> (Desh.) | | | | * |
| " <i>semistriata</i> (Desh.) | | | | * |
| " <i>fratercula</i> (Desh.) | | | | * |
| " <i>Harnesi</i> (Desh.) | | | | * |
| " <i>parviti</i> (Desh.) | | | | * |
| <i>Nemocardium</i> <i>semiasperum</i> (Desh.) | | | | * |
| <i>Fragum</i> <i>rachitis</i> (Desh.) | | | | * |
| " <i>nite</i> (Coss.) | | | | * |
| <i>Lithocardium</i> <i>aviculari</i> (Lam.) | | | | * |
| " <i>cymbulari</i> (Lam.) | | | | * |
| " (<i>Byssocardium</i>) <i>emarginatum</i> (Desh.) | | | | * |
| <i>Chama</i> <i>subgigas</i> , D'Orb. | | | | * |
| " <i>distans</i> , Desh. | | | | * |
| " <i>papyracea</i> , Desh. | | | | * |
| " <i>inornata</i> , Desh. | | | | * |
| " <i>calcarata</i> , Lam. | | | | * |
| " <i>lamellosa</i> , Lam. | | | | * |
| " <i>fimbriata</i> , Defr. | | | | * |
| " <i>sulcata</i> , Desh. | | | | * |
| " <i>turgidula</i> , Lam. | | | | * |
| " <i>Bezanconi</i> , Coss. | | | | * |
| " <i>plicatella</i> , Mellev. | | | | * |
| " <i>punctulata</i> , Desh. | | | | * |
| " <i>intricata</i> , Desh. | | | | * |
| " <i>depauperata</i> , Desh. | | | | * |
| " <i>squamosa</i> , Sol. | | | | * |
| <i>Sportella</i> <i>dubia</i> (Desh.) | | | | * |
| " <i>Caillati</i> , Desh. | | | | * |

| 10. PELECYPODA. | | L.L.E. | L.F. | M.E. | U.E. | 11. PELECYPODA. | | L.L.E. | L.F. | M.E. | U.E. | 12. PELECYPODA. | | L.L.E. | L.F. | M.E. | U.E. | |
|---|--|--------|------|------|------|---|--|----------|----------|----------|----------|---|----------|----------|----------|----------|------|--|
| [<i>Sportella</i>] | | | | | | [<i>Lucina</i>] | | | | | | [<i>Lucina</i>] | | | | | | |
| " | <i>erycinoides</i> , Desh. ... | | | * | * | " (<i>Milha</i>) <i>Caillati</i> , Desh. ... | | | | | | " (<i>Dentilucina</i>) <i>intusplicata</i> , Coss.... | | | | * | * | |
| " | <i>macronya</i> , Desh. ... | | | * | * | " <i>Argus</i> , Mell. ... | | | | | | " <i>tabulata</i> , Desh. ... | | | | * | * | |
| " | <i>depressa</i> , Desh. ... | | | | | " <i>depressa</i> , Desh. ... | | | | | | " (<i>Divaricella</i>) <i>pulchella</i> , Ag. | | | | * | * | |
| " | <i>fragilis</i> , Desh. ... | | * | | | " <i>subcircularis</i> , Desh. ... | | | | | | " <i>discors</i> , Desh. ... | | | | * | * | |
| " | <i>Bezanconi</i> , Coss. ... | | | | | " <i>Cuvieri</i> , Bayan ... | | | | | | " <i>Bourdoti</i> , Coss. ... | | | | * | * | |
| " | <i>modesta</i> , Desh. ... | | * | | | " <i>contorta</i> , Defr. ... | | * | | | | " <i>ermenonvillensis</i> , D'Orb. ... | | | | * | * | |
| " | <i>gibbosula</i> , Desh. ... | | | | | " <i>contortula</i> , Desh. ... | | | | | | " <i>Rigaulti</i> , Desh. ... | | | | * | * | |
| " | <i>irradiata</i> , Coss. ... | | | | | " (<i>Here</i>) <i>Barbieri</i> , Desh. ... | | | | | | " (<i>Loripinus</i>) <i>sphaericula</i> , Desh.... | | | | * | * | |
| " | <i>apiciatis</i> , Desh. ... | | * | | | " (<i>Cavilucina</i>) <i>elegans</i> , Defr. ... | | | | | | " <i>parnensis</i> , Desh. ... | | | | * | * | |
| " | <i>proxima</i> , Desh. ... | | | | | " <i>sulcata</i> , Lam. ... | | | | | | " <i>parnensis</i> , Desh. ... | | | | * | * | |
| " | <i>nitens</i> , Desh. ... | | | | | " <i>Levesquei</i> , D'Orb. ... | | | | | | " <i>Conili</i> , De Rainc. ... | | | | * | * | |
| " | <i>donaciformis</i> , Desh. ... | | | | | " <i>bipartita</i> , Defr. ... | | | | | | " <i>tenuis</i> , Desh. ... | | | | * | * | |
| " | <i>corbulina</i> , Desh. ... | | | | | " <i>Bernayi</i> , Coss. ... | | | | | | <i>Ludovicica squamula</i> , Coss. ... | | | | * | * | |
| " | (<i>Angusticardo</i>) <i>rotundata</i> (Desh.) ... | | | | | " (<i>Dentilucina</i>) <i>ambigua</i> , Defr. ... | | | | | | <i>Passaya Eugeni</i> , Desh. ... | | | | * | * | |
| " | <i>variabilis</i> , Coss. ... | | | | | " <i>saxorum</i> , Lam. ... | | | | | | <i>Scintilla parisiensis</i> , Desh. ... | | | | * | * | |
| " | <i>faula</i> , Coss. ... | | | | | " <i>proxima</i> , Desh. ... | | | | | | " <i>angusta</i> (Desh.) ... | | | | * | * | |
| <i>Corbis lamellosa</i> (Lam.) ... | | | | | | " <i>sparnacensis</i> , Desh. ... | | * | | | | " <i>ambigua</i> , Desh. ... | | | | * | * | |
| " | <i>Davidsoni</i> (Desh.) ... | | * | | | " <i>mutata</i> , Desh. ... | | * | | | | " <i>halitus</i> (Desh.) ... | | | | * | * | |
| " | <i>subpectunculus</i> , D'Orb. ... | | | | | " <i>concaua</i> , Defr. ... | | * | | | | " <i>minuta</i> , Coss. ... | | | | * | * | |
| <i>Parvicorbis subarata</i> (Coss.) ... | | | | | | " <i>Michelini</i> , Desh. ... | | * | | | | " (?) <i>texta</i> , Coss. ... | | | | * | * | |
| " | <i>goodallina</i> (Coss.) ... | | | | | " <i>concentrica</i> , Lam. ... | | * | | | | <i>Hindsiella arcuata</i> (Lam.) ... | | | | * | * | |
| <i>Mystia ingens</i> (Desh.) ... | | | * | | | " <i>enudata</i> , Desh. ... | | * | | | | " <i>inaequilobata</i> (Desh.) ... | | | | * | * | |
| " | <i>grata</i> (Desh.) ... | | | | | " <i>deirita</i> , Desh. ... | | * | | | | " <i>pustulosa</i> (Desh.) ... | | | | * | * | |
| " | <i>lucinoides</i> (Desh.) ... | | | | | " <i>concinna</i> , Desh. ... | | * | | | | " <i>parisiensis</i> (De Rainc.) ... | | | | * | * | |
| " | <i>aizyensis</i> (Desh.) ... | | * | | | " <i>planulata</i> , Desh. ... | | * | | | | " <i>lobata</i> (Desh.) ... | | | | * | * | |
| " | <i>transversaria</i> (Coss.) ... | | | | | " <i>grata</i> , Defr. ... | | * | | | | " <i>lata</i> (Desh.) ... | | | | * | * | |
| | | | | | | | | <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | | <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | | |

| | a | b | c | d |
|--|-----|---|---|---|
| " <i>striatima</i> (Desh.) | ... | | | |
| " <i>Guyardeti</i> (Desh.) | ... | | | |
| " <i>cælara</i> (Desh.)... | * | | | |
| " <i>renulata</i> (Lam.) | ... | | * | |
| " <i>decipiens</i> (Desh.) | ... | | * | |
| " <i>grignonensis</i> (Desh.) | ... | | * | |
| " <i>profunda</i> (Desh.) | ... | * | | |
| " <i>Lamberti</i> (Desh.) | ... | * | | |
| " <i>auversiensis</i> (Desh.) | ... | | | |
| " <i>Morleti</i> , Coss. ... | ... | | | |
| " <i>irradiata</i> , Coss. | ... | | | |
| " (<i>Diplodonta bimpressa</i> (Desh.)... | ... | | | |
| " <i>duplicata</i> (Desh.) | ... | * | | |
| " <i>bidens</i> (Desh.) | ... | | | |
| " <i>elliptica</i> (Lam.) | ... | | * | |
| " <i>larvigata</i> (Desh.) | ... | | * | |
| " <i>Eudora</i> (Desh.) | ... | | | |
| " <i>segregata</i> , Coss. | ... | * | | |
| " <i>consors</i> (Desh.) | ... | * | | |
| " <i>saincyensis</i> (Desh.) | ... | | * | |
| " <i>inaequalis</i> (Desh.) | ... | * | | |
| " <i>radians</i> (Mell.) | ... | * | | |
| <i>Axinis Goodalli</i> (Sow.) | ... | * | | |
| <i>Brongniarti</i> (Desh.) | ... | * | | |
| " <i>consobrina</i> , Desh. | ... | * | | |
| " <i>caloprocta</i> , Coss. | ... | * | | |
| " <i>gibbosula</i> , Lam. | ... | * | | |
| " <i>callosa</i> (Lam.) | ... | * | | |
| " <i>Lefevrei</i> , Coss. | ... | * | | |
| " (<i>Miltha gigantea</i> , Desh.) | ... | * | | |
| " <i>mutabilis</i> , Lam. | ... | * | | |
| " <i>Gravesi</i> , Desh. | ... | * | | |
| " <i>uncinata</i> , Defr. | ... | * | | |
| " <i>decipiens</i> , Desh. | ... | * | | |
| " <i>prona</i> , Desh. | ... | * | | |
| " <i>subrigona</i> , Desh. | ... | * | | |
| " <i>spisula</i> , Desh. | ... | * | | |
| " <i>brevifurcata</i> , Coss.... | ... | * | | |
| " <i>Dautzenbergi</i> , Coss. | ... | * | | |
| " <i>inaequalitatis</i> , Desh. | ... | * | | |
| " <i>Mayeri</i> , Desh. | ... | * | | |
| " <i>hermonvillensis</i> , Desh. | ... | * | | |
| " <i>scalaris</i> , Defr. | ... | * | | |
| " <i>Hærnesi</i> , Desh. | ... | * | | |
| " <i>squamula</i> , Desh. | ... | * | | |
| " <i>bicristata</i> , Coss. | ... | * | | |
| " <i>Requieni</i> , Lévesq. | ... | * | | |
| " <i>difficilis</i> , Desh. | ... | * | | |
| " <i>notata</i> , Desh. | ... | * | | |
| " <i>crenularis</i> , Desh. | ... | * | | |
| " <i>umblicata</i> , Desh. | ... | * | | |
| " <i>minuta</i> , Desh. | ... | * | | |
| " <i>Foucardi</i> , Desh. | ... | * | | |
| " <i>microdonta</i> , Desh. | ... | * | | |
| " <i>albella</i> , Lam. | ... | * | | |
| " <i>lobulata</i> , Desh. | ... | * | | |
| " <i>Bouryi</i> , Coss. | ... | * | | |
| " <i>inornata</i> , Desh. | ... | * | | |
| " <i>latebrosa</i> , Desh. | ... | * | | |
| " <i>pusilla</i> , Desh. | ... | * | | |
| " <i>turgidula</i> , Desh. | ... | * | | |
| " <i>seminulum</i> , Desh. | ... | * | | |
| " <i>ventricosa</i> , Wat. | ... | * | | |
| " <i>nana</i> , Desh. | ... | * | | |
| " <i>Lepton textile</i> , Desh. ... | ... | | | |
| " <i>nitidissimum</i> , Desh. | ... | | | |
| " <i>levigatum</i> , Desh. | ... | | | |
| " <i>pusillum</i> (Desh.) | ... | | | |
| <i>Erycina pellicida</i> , Lam. | ... | | | |
| " <i>arcata</i> , Desh. ... | ... | | | |
| " <i>grignonensis</i> , Desh. | ... | | | |
| " <i>Defrancei</i> , Recluz | ... | | | |
| " <i>latens</i> , Desh.... | ... | | | |
| " <i>striatissima</i> , Desh. | ... | | | |
| " <i>rectilinearis</i> , Coss. | ... | | | |
| " <i>irregularis</i> , Recluz | ... | | | |
| " <i>obsoleta</i> , Desh. | ... | | | |
| " <i>parvula</i> , Desh. | ... | | | |
| " <i>ruellensis</i> , Coss. | ... | | | |
| " <i>Foucardi</i> , Desh. | ... | | | |
| " <i>longidentata</i> , Desh. | ... | | | |
| " <i>transversaria</i> , Coss. | ... | | | |
| " <i>trigonularis</i> , Desh. | ... | | | |
| " <i>parisiensis</i> , Recluz | ... | | | |
| " <i>Bernayi</i> , Desh. | ... | | | |
| " <i>calyculata</i> , Baudon | ... | | | |
| " <i>affinis</i> , Desh. | ... | | | |
| " <i>prisca</i> , De Laub. | ... | | | |
| " <i>Recluzi</i> , Desh. | ... | | | |
| " <i>tenuicula</i> , Desh. | ... | | | |
| " <i>Lamarcki</i> , Recluz | ... | | | |
| " <i>radiatula</i> , Desh. | ... | | | |
| " <i>sempecten</i> , Coss. | ... | | | |
| " <i>(?) Passyana</i> , Desh. | ... | | | |
| <i>Kellyia subtriangularis</i> (Desh.) | ... | | | |
| " <i>solidula</i> (Desh.) | ... | | | |
| " <i>signata</i> (Desh.) | ... | | | |

| 13. PELECYPODA. | | | 14. PELECYPODA. | | | 15. PELECYPODA. | | | | | |
|--|------|------|--------------------|--|------|--------------------|------|---------------------------------------|------|------|------|
| L.F.E. | L.F. | M.F. | U.F. | L.F.E. | L.F. | M.F. | U.F. | L.F.E. | L.F. | M.F. | U.F. |
| [<i>Kellyia</i>] | | | | [<i>Crassatella</i>] | | | | <i>Nucula subovata</i> , D'Orb. | | | |
| " <i>aequilateralis</i> , Coss. | | | * | " <i>laevigata</i> , Lam. | | | * | " <i>bisulcata</i> , Sow. | | | * |
| " <i>Laubrierei</i> , Coss. | | | * | " <i>Cardita aspera</i> , Lam. | | | * | " <i>Bronni</i> , Desh. | | | * |
| " <i>Chevallieri</i> , Coss. | * | | * | " <i>squamatina</i> , Desh. | | | * | " <i>parisiensis</i> , Desh. | | | * |
| " <i>elliptica</i> , Coss. | | * | * | " <i>aequicostata</i> , Coss. | | | * | " <i>mixta</i> , Desh. | | | * |
| " (<i>Pythina</i>) <i>eocenica</i> (De Ranc.) | | * | * | " (<i>Miodon</i>) <i>cuneata</i> , Coss. | | | * | " <i>terminalis</i> , Desh. | | | * |
| " <i>ovoides</i> , Coss. | | * | * | " <i>decussata</i> , Lam. | | | * | " <i>lunulata</i> , Nyst. | | | * |
| " <i>pauciplicata</i> (Desh.) | | * | * | " <i>Bezanconi</i> , Coss. | | | * | " <i>similis</i> , Sow. | | | * |
| " <i>laticosta</i> , Coss. | | * | * | " <i>radiolata</i> , Desh. | | | * | " <i>fragilis</i> , Desh. | | | * |
| " (<i>Divarikellyia</i>) <i>essomiensis</i> , Coss. | | * | * | " <i>modica</i> , Desh. | | | * | " <i>Woodi</i> , Coss. | | | * |
| " <i>nitida</i> (Caill.) | | * | * | " <i>astartoides</i> , Desh. | | | * | " <i>capillacea</i> , Desh. | | | * |
| " <i>obliqua</i> (Caill.) | * | * | * | " <i>dameriacensis</i> , Coss. | | | * | " <i>minor</i> , Desh. | | | * |
| " <i>Caillati</i> (Desh.) | | * | * | " <i>atomus</i> , Desh. | | | * | " <i>Nuculana striata</i> (Lam.) | | | * |
| " <i>breviuscula</i> (Desh.) | | * | * | " (<i>Glans</i>) <i>calciatrapoides</i> , Lam. | | | * | " <i>costulata</i> (Desh.) | | | * |
| " (<i>Planikellyia</i>) <i>radiolata</i> (Lam.) | | * | * | " <i>densicostata</i> , Coss. | | | * | " <i>prisca</i> (Desh.) | | | * |
| " <i>texta</i> , Coss | | * | * | " <i>Venericardia planicosta</i> (Lam.) | | | * | " <i>Galeottii</i> (Nyst.) | | | * |
| " <i>orbicularis</i> (Desh.) | | * | * | " <i>pectuncularis</i> (Lam.) | | | * | " <i>tumidula</i> (Coss.) | | | * |
| " <i>undulata</i> (Lam.) | | * | * | " <i>multicostata</i> (Lam.) | | | * | " <i>laevigata</i> (Wat.) | | | * |
| " <i>Baudoni</i> (De-b.) | | * | * | " <i>imbricata</i> (Gmel.) | | | * | " <i>Nucinella miliaris</i> (Desh.) | | | * |
| " <i>symmetrica</i> (Desh.) | | * | * | " <i>eudacata</i> , (Bayan) | | | * | " <i>ovalina</i> , Coss. | | | * |
| " (<i>Anomalobellyia</i>) <i>catalaunensis</i> (Coss.) | * | | * | " <i>complanata</i> (Desh.) | | | * | " <i>Trinacria cancellata</i> (Desh.) | | | * |
| <i>Lutetia umbonata</i> , Desh. | | * | * | " <i>acuticostata</i> (Lam.) | | | * | " <i>deltoidea</i> (Lam.) | | | * |
| " <i>parisiensis</i> , Desh. | | * | * | " <i>profunda</i> (Desh.) | | | * | " <i>inequilateralis</i> (D'Orb.) | | | * |
| " <i>deficiens</i> , Coss. | | * | * | " <i>angusticostata</i> (Desh.) | | | * | " <i>curvirostris</i> (Coss.) | | | * |
| | | | | " <i>catalaunensis</i> (De Laub.) | | | * | " <i>media</i> (Desh.) | | | * |
| | | | | " <i>atizyensis</i> (Desh.) | | | * | " <i>plesiomorpha</i> , Coss. | | | * |
| | | | | " <i>Prevosti</i> (Desh.) | | | * | " <i>crassa</i> (Desh.) | | | * |
| | a | c | d | | a | c | d | | a | c | d |

| | a | b | c | d |
|--|---|---|---|---|
| <i>Laubrierea emarginata</i> (Desh.) | | | | |
| " <i>cycloides</i> , Coss. | * | | * | * |
| " <i>cultellus</i> , Coss. | * | | * | * |
| " <i>goodallina</i> , Coss. | * | | * | * |
| <i>Lusæa deniensis</i> (Desh.) | * | | * | * |
| " <i>donaciformis</i> (Desh.) | * | | * | * |
| <i>Goodallioopsis terminalis</i> (Desh.) | * | | * | * |
| <i>Montucuta tenuissima</i> , Coss. | * | | * | * |
| <i>Kelyella Leana</i> (Desh.) | * | | * | * |
| <i>Solenomya Civierii</i> , Desh. | * | | * | * |
| " <i>Blainvillæi</i> , Desh. | * | | * | * |
| " <i>angusta</i> (Desh.) | * | | * | * |
| <i>Crassatella plumbea</i> (Chem.) | * | | * | * |
| " <i>Thallavignæi</i> , Desh. | * | | * | * |
| " <i>salsensis</i> , D'Arch. | * | | * | * |
| " <i>scutellaria</i> , Desh. | * | | * | * |
| " <i>parisiensis</i> , D'Orb. | * | | * | * |
| " <i>sinuosa</i> , Desh. | * | | * | * |
| " <i>gibbosula</i> , Lam. | * | | * | * |
| " <i>distincta</i> , Desh. | * | | * | * |
| " <i>bilboacensis</i> , Desh. | * | | * | * |
| " <i>lamellosa</i> , Lam. | * | | * | * |
| " <i>curvata</i> , Desh. | * | | * | * |
| " <i>compressa</i> , Lam. | * | | * | * |
| " <i>Desmaresti</i> , Desh. | * | | * | * |
| " <i>dilatata</i> , Desh. | * | | * | * |
| " <i>sulcata</i> (Sol.) | * | | * | * |
| " <i>rostrata</i> , Desh. | * | | * | * |
| " <i>donacialis</i> , Desh. | * | | * | * |
| " <i>tenuistrata</i> , Desh. | * | | * | * |
| " <i>grignonensis</i> , Desh. | * | | * | * |
| " <i>propinqua</i> , Wat. | * | | * | * |
| " <i>trigonata</i> , Lam. | * | | * | * |
| " <i>aliena</i> (Desh.) | * | | * | * |
| " <i>Davidsoni</i> (Desh.) | * | | * | * |
| " <i>serrulata</i> (Desh.) | * | | * | * |
| " <i>ambigua</i> (Desh.) | * | | * | * |
| " <i>sulcata</i> (Sol.) | * | | * | * |
| " <i>pulchra</i> (Desh.) | * | | * | * |
| " <i>p. opingua</i> (Desh.) | * | | * | * |
| " <i>pusilla</i> (Desh.) | * | | * | * |
| " <i>squamosa</i> (Lam.) | * | | * | * |
| " <i>asperula</i> (Desh.) | * | | * | * |
| " <i>elegans</i> (Lam.) | * | | * | * |
| " <i>ornata</i> (Desh.) | * | | * | * |
| " <i>onorata</i> (Desh.) | * | | * | * |
| " <i>guttifera</i> (Coss.) | * | | * | * |
| " <i>caunoniensis</i> (Desh.) | * | | * | * |
| <i>Goossensia irregularis</i> (Desh.) | * | | * | * |
| " <i>insculpta</i> (Desh.) | * | | * | * |
| <i>Goodallia miliaris</i> (Lam.) | * | | * | * |
| " <i>obscura</i> (Lam.) | * | | * | * |
| " <i>lævigata</i> , Desh. | * | | * | * |
| " <i>producta</i> , Coss. | * | | * | * |
| " <i>herouvalensis</i> , Desh. | * | | * | * |
| " <i>terminalis</i> , Desh. | * | | * | * |
| <i>Woodia crenulata</i> , Desh. | * | | * | * |
| " <i>marginalis</i> , Desh. | * | | * | * |
| " <i>profunda</i> , Desh. | * | | * | * |
| " <i>Parisiella ambigua</i> , Coss. | * | | * | * |
| <i>Unio Michaudi</i> , Desh. | * | | * | * |
| " <i>truncatosus</i> , Michaud | * | | * | * |
| " <i>Wateleti</i> , Desh. | * | | * | * |
| " (Margartiana) <i>Cordieri</i> | * | | * | * |
| " (Ch. d'Orb.) | * | | * | * |
| " <i>antiquus</i> (Ch. d'Orb.) | * | | * | * |
| " <i>Baudoni</i> , Mayer | * | | * | * |
| " <i>mixta</i> , Mayer | * | | * | * |
| <i>Limopsis granulata</i> (Lam.) | * | | * | * |
| " <i>lentiformis</i> , Desh. | * | | * | * |
| " <i>allera</i> , Desh. | * | | * | * |
| " <i>nana</i> (Lam.) | * | | * | * |
| " <i>chonioides</i> , Coss. | * | | * | * |
| " <i>per obliqua</i> , Coss. | * | | * | * |
| " <i>Gysseyi</i> (De Rainc.) | * | | * | * |
| <i>Axincea terebratularis</i> (Lam.) | * | | * | * |
| " <i>paucaidentata</i> (Desh.) | * | | * | * |
| " <i>tenuis</i> (Desh.) | * | | * | * |
| " <i>angustidens</i> (Wat.) | * | | * | * |
| " <i>polymorpha</i> (Desh.) | * | | * | * |
| " <i>humilis</i> (Desh.) | * | | * | * |
| " <i>Bezauconi</i> | * | | * | * |
| " <i>pseudopulvinata</i> | * | | * | * |
| " (D'Orb.) | * | | * | * |
| " <i>dispar</i> (Defr.) | * | | * | * |
| " <i>pulvinata</i> (Lam.) | * | | * | * |
| " <i>subangulata</i> (Desh.) | * | | * | * |
| " <i>depressa</i> (Desh.) | * | | * | * |
| " <i>dissimilis</i> (Desh.) | * | | * | * |
| " (Cnisma) <i>nuclata</i> (Lam.) | * | | * | * |
| <i>Arca biangula</i> , Lam. | * | | * | * |
| " <i>minuta</i> , Desh. | * | | * | * |
| " <i>laudunensis</i> , Desh. | * | | * | * |
| " <i>disjuncta</i> , Desh. | * | | * | * |
| " (Acar) <i>lamellosa</i> , Desh. | * | | * | * |
| " <i>Lyelli</i> , Desh. | * | | * | * |
| " (Barbata) <i>scabrosa</i> , Nyst. | * | | * | * |
| " <i>Morlieri</i> , Desh. | * | | * | * |
| " <i>filigrana</i> , Desh. | * | | * | * |

| 16. PELECYPODA. | | 17. PELECYPODA. | | 18. PELECYPODA. | | L.F.E. | L.F. | M.E. | U.E. |
|--------------------|-----------------------------------|--------------------|--|--------------------|--|--------|------|------|------|
| [<i>Arca</i>] | <i>(Barbatia) sculpta</i> , Desh. | [<i>Mytilus</i>] | <i>subantiquus</i> , D'Orb.... | [<i>Avicula</i>] | <i>aizensis</i> , Desh. | * | | | |
| " | <i>Baudoni</i> , Coss. | " | <i>levigatus</i> , Desh. | " | <i>microptera</i> , Desh. | * | | | |
| " | <i>sabuletorum</i> , Desh.... | " | <i>eurynotus</i> , Coss. | " | <i>trigonata</i> , Lam. | * | | * | |
| " | <i>insignis</i> , Desh. | " | (<i>Arcomytilus</i>) <i>Rigaulti</i> , | " | <i>fragilis</i> , Defr. | * | | * | |
| " | <i>auversiensis</i> , Desh.... | " | Desh.... | " | <i>DeFrancisci</i> , Desh. | * | | * | |
| " | <i>barbatula</i> , Lam. | " | <i>Levesquei</i> , Desh. | " | (<i>Aviculoberna</i>) <i>aviculina</i> , | * | | * | |
| " | <i>appendiculata</i> , Sow.. | " | <i>Biochei</i> , Desh. | " | Desh.... | * | | * | |
| " | <i>irregularis</i> , Desh.... | " | <i>Dutemplei</i> , Desh. | " | <i>cosmeta</i> , Coss. | * | | * | |
| " | <i>textilosa</i> , Desh. | " | <i>Septifer serratus</i> (Mellev.) ... | " | <i>Dixonii</i> , Desh. | * | | * | |
| " | <i>Boutilieri</i> , Coss. | " | <i>depressus</i> (Desh.) ... | " | <i>Wateleti</i> , Desh. | * | | * | |
| " | <i>articulata</i> , Desh. | " | <i>Dreissensia curvirostris</i> , Coss. | " | <i>calvimonensis</i> , Desh. | * | | * | |
| " | <i>amygdaloides</i> , Desh | " | <i>chontoides</i> , Coss.... | " | <i>Perna Lamarcki</i> , Desh. | * | | * | |
| " | <i>asperula</i> , Desh. | " | <i>Modiola dolabrata</i> , Desh. | " | <i>Bazini</i> , Desh.... | * | | * | |
| " | <i>cylindracea</i> , Desh.... | " | (<i>Amygdalum</i>) <i>subcarinata</i> , | " | <i>Gervillia eocanica</i> , Desh. | * | | * | |
| " | <i>Bernayi</i> , Desh. | " | Lam.... | " | <i>Aviculonulsa macrolis</i> (Desh.) | * | | * | |
| " | <i>ornata</i> , Desh. | " | <i>subangulata</i> , Desh. | " | <i>favellensis</i> , Coss. | * | | * | |
| " | <i>Gervaisi</i> , Bayan | " | <i>semilevigata</i> , Desh. | " | <i>Vulsella deperdita</i> , Lam. | * | | * | |
| " | <i>distans</i> , Desh. | " | (<i>Brachidontes</i>) <i>pectinata</i> , | " | <i>anomala</i> , Desh. | * | | * | |
| " | <i>Edwardsi</i> , Desh. | " | Lam.... | " | <i>angusta</i> , Desh. | * | | * | |
| " | <i>interrupia</i> , Lam. | " | <i>crenella</i> , Desh. | " | <i>minima</i> , Desh. | * | | * | |
| " | <i>gracilis</i> , Desh. | " | <i>ambigua</i> , Desh. | " | <i>Vulsellina chaussyensis</i> , De | * | | * | |
| " | <i>aviculina</i> , Desh.... | " | <i>acuminata</i> , Desh.... | " | Rainc.... | * | | * | |
| " | <i>Duchasteli</i> , Desh.... | " | <i>ocrophata</i> , Coss. | " | <i>Anomalomya corrugata</i> , Coss. | * | | * | |
| " | <i>obliquaria</i> , Desh.... | " | <i>Lithodonus Deshayesi</i> , J. Sow. | " | <i>Berthelinia elegans</i> , Crosse ... | * | | * | |
| " | <i>stratularis</i> , Desh.... | " | <i>hemirhabdotus</i> , | " | <i>Lima spatulata</i> , Lam. | * | | * | |
| " | <i>spatulata</i> , Desh.... | " | Coss.... | " | <i>rara</i> , Desh. | * | | * | |
| " | <i>magellanoides</i> , Desh. | " | <i>argentinus</i> , Desh. | " | <i>pretiosa</i> , Desh. | * | | * | |
| | | | | | | a | b | c | d |
| | | | | | | a | b | c | d |

| a | b | c | d |
|---------------------------------|---|---|---|
| Rigaulti, Desh. | * | * | * |
| modioliformis, Desh. | * | * | * |
| Marceauxi, Desh. | * | * | * |
| (Plagiarca) angusta, Lam | * | * | * |
| lucida, Desh. | * | * | * |
| intersecta, Desh. | * | * | * |
| exornata, Desh. | * | * | * |
| punctifera, Desh. | * | * | * |
| (Anadara) granulosa, Desh. | * | * | * |
| globulosa, Desh. | * | * | * |
| miliacea, Coss. | * | * | * |
| scapulina, Lam. | * | * | * |
| (Fossularca) quadrilatera, | * | * | * |
| Desh. | * | * | * |
| capillacea, Desh. | * | * | * |
| dispar, Desh. | * | * | * |
| margaritula, Desh. | * | * | * |
| Cossmanni, DeLaub. | * | * | * |
| textilis, Desh. | * | * | * |
| decipiens, Desh. | * | * | * |
| multidentata, Desh. | * | * | * |
| lissa, Bayan | * | * | * |
| effossa, Desh. | * | * | * |
| Bezauconi, Coss. | * | * | * |
| Chevallieri, Coss. | * | * | * |
| (Cucullaria) heterodontia, | * | * | * |
| Desh. | * | * | * |
| cucullaris, Desh. | * | * | * |
| adversidentata, Desh. | * | * | * |
| Caillati, Desh. | * | * | * |
| Cucullera crassatina, Lam. | * | * | * |
| Mytilus acutangulus, Desh. | * | * | * |
| rimosus, Lam. | * | * | * |
| cordatus (Lam.).... | * | * | * |
| papyraceus, Desh. | * | * | * |
| Modiolaria semimuda, Desh. | * | * | * |
| arciformis, Coss. | * | * | * |
| (Semimodiola) hastata, Desh. | * | * | * |
| angularis, Desh. | * | * | * |
| Bernayi, Desh. | * | * | * |
| pectiniformis, Desh. | * | * | * |
| Pietheti, Desh. | * | * | * |
| (Planimodiola) sulcata | * | * | * |
| (Lam.).... | * | * | * |
| subrostrata, Desh. | * | * | * |
| arenularia, De Rainc. | * | * | * |
| & Mun. Chal. | * | * | * |
| aizyensis, Coss. | * | * | * |
| spatulata (Desh.) | * | * | * |
| interjecta, Desh. | * | * | * |
| Arcoperna radiolata (Desh.).... | * | * | * |
| capillaris (Desh.).... | * | * | * |
| brevis (Desh.) | * | * | * |
| Melleuillei (D'Orb.) | * | * | * |
| fragiles (Chelot).... | * | * | * |
| valbo tenensis (Wat.) | * | * | * |
| profunda (Desh.).... | * | * | * |
| tenera (Desh.) | * | * | * |
| Crenella elegans, Desh. | * | * | * |
| striatina, Desh. | * | * | * |
| cucullata, Desh. | * | * | * |
| Pinna margaritacea, Lam. | * | * | * |
| fragilis, Wat. | * | * | * |
| Avicula Harnesi, Desh. | * | * | * |
| transversa, Desh. | * | * | * |
| herouvalensis, Desh.... | * | * | * |
| Abelloides, Desh. | * | * | * |
| quadrilatera, Wat. | * | * | * |
| diastrophia, Desh. | * | * | * |
| plicata, Lam. | * | * | * |
| Caillati, Desh. | * | * | * |
| (Limatula) bulloides, Lam. | * | * | * |
| analogia, Wat. | * | * | * |
| Bernayi, Coss. | * | * | * |
| tenuis, Desh. | * | * | * |
| Barreti, Morlet.... | * | * | * |
| obliqua, Lam. | * | * | * |
| Morheriei, Wat. | * | * | * |
| dilatata, Lam. | * | * | * |
| Limca eocænica, De Laub. | * | * | * |
| tenuisculpta, Coss. | * | * | * |
| Chlamys milis, (Desh.) | * | * | * |
| escharoides (Desh.) | * | * | * |
| subornata (D'Orb.).... | * | * | * |
| multicarinata (Desh.) | * | * | * |
| triparita (Desh.) | * | * | * |
| operosa (Desh.) | * | * | * |
| parisiensis (D'Orb.) | * | * | * |
| opata (Desh.) | * | * | * |
| infimata (Lam.) | * | * | * |
| plebeia (Lam.) | * | * | * |
| multistriata (Desh.) | * | * | * |
| (Pseudamussium) solea | * | * | * |
| (Desh.).... | * | * | * |
| Melleuillei (D'Orb.) | * | * | * |
| cornuola (Wood) | * | * | * |
| (Propeamussium) brevis- | * | * | * |
| aurita (Desh.).... | * | * | * |
| Prestwichi (Morris) | * | * | * |

| | a | b | c | d |
|---|-----|---|---|---|
| " <i>Iudensis</i> , Desh. | ... | | | |
| " <i>cariosa</i> , Desh. | ... | | | |
| " <i>gigantica</i> , Sol. | ... | | | |
| " <i>varilamella</i> , Mellev. | ... | * | | |
| " <i>sparuacensis</i> , Defr. | ... | * | | |
| " <i>angusta</i> , Desh. | ... | | * | |
| " <i>mutabilis</i> , Desh. | ... | | | * |
| " <i>subpunctata</i> , D'Orb. | ... | | | * |
| " <i>-gyphina</i> , Desh. | ... | | | * |
| " <i>Cosmanni</i> , Doll. | ... | | | * |
| " <i>radiosa</i> , Desh. | ... | | | * |
| " <i>elegans</i> , Desh. | ... | | | * |
| " <i>suesstoniensis</i> , Desh. | ... | | | * |
| " <i>extensa</i> , Desh. | ... | | | * |
| " <i>bellovacensis</i> , Lam. | ... | * | | |
| " <i>multicosta</i> , Desh. | ... | * | | |
| " <i>cymbula</i> , Lam. | ... | | * | |
| " <i>submissa</i> , Desh. | ... | | * | |
| " <i>plicata</i> , Sol. ... | ... | | * | |
| " <i>cubitus</i> , Desh. ... | ... | | * | |
| " <i>uncinata</i> , Lam. | ... | | * | |
| " (<i>Pycnodonta</i>) <i>cymbiola</i> , Desh. | ... | | * | |
| " <i>Defrancei</i> , Desh. | ... | | * | |
| " <i>eversa</i> , Mellev. | ... | | * | |
| " <i>Anomia tenuistriata</i> , Desh. | ... | | * | |
| " <i>primæva</i> , Desh. | ... | * | | |
| " <i>Casunovei</i> , Desh. | ... | | * | |
| " <i>psamatheis</i> , Bayan | ... | | * | |
| " <i>rugosula</i> , Desh. | ... | | * | |
| " <i>planulata</i> , Desh. | ... | | * | |
| " <i>echinulata</i> , Desh. | ... | | * | |
| " <i>viscellata</i> , Desh. | ... | | * | |
| " <i>hinnitoides</i> , Coss. | ... | | * | |
| " <i>Pulsellum neglectum</i> , Coss. ... | ... | | * | |
| " <i>dilatatum</i> , Coss. ... | ... | | * | |
| " <i>Siphonodentalium parisiense</i> (Desh.) ... | ... | * | | |
| " <i>Meyeri</i> , Coss. ... | ... | * | | |
| " (<i>Dischides</i>) <i>Bouryi</i> , Coss. | ... | * | | |
| " <i>bilabiatum</i> (Desh.) ... | ... | * | | |
| " <i>breve</i> (Desh.) ... | ... | * | | |
| GASTROPODA. | | | | |
| " <i>Chiton grignonensis</i> , Lam. ... | ... | | | |
| " <i>Defrancei</i> , De Rocheb. | ... | | | |
| " <i>Heberti</i> , De Rocheb. ... | ... | * | | |
| " <i>Bernayi</i> , Coss. ... | ... | | | |
| " <i>Morleti</i> , De Rocheb. ... | ... | | | |
| " <i>Bouryi</i> , De Rocheb. ... | ... | | | |
| " <i>Fischeri</i> , De Rocheb. ... | ... | | | |
| " <i>Bezanconi</i> , De Rocheb. | ... | | | |
| " <i>Bourdoti</i> , De Rocheb. | ... | | | |
| " <i>Enophochiton Rochebruneti</i> , Coss. | ... | | | |
| " <i>Patella lophophora</i> , Coss. 1 ... | ... | * | | |
| " <i>Marceauxi</i> , Desh. ... | ... | | | |
| " <i>Rigaulti</i> , Desh. | ... | | | |
| " <i>Raincourtii</i> , Desh. ... | ... | | | |
| " <i>Defrancei</i> , Desh. ... | ... | | | |
| " <i>delicatula</i> , Desh. ... | ... | | | |
| " <i>contigua</i> , Desh. ... | ... | | | |
| " <i>centralis</i> , Desh. ... | ... | | | |
| " <i>glabra</i> , Desh. ... | ... | | | |
| " <i>Acmaea Dutemplei</i> (Desh.) ... | ... | | | |
| " <i>Helcyon Boutillieri</i> , Coss. ... | ... | | | |
| " (<i>Entomella</i>) <i>cymbiola</i> , Desh. | ... | | | |
| " <i>clypeata</i> , Lam. | ... | | | |
| " <i>Submarginula fenestrata</i> , Desh. | ... | * | | |
| " <i>elegans</i> (Defr.) ... | ... | | * | |
| " <i>radiola</i> (Lam.) ... | ... | | * | |
| " <i>thurysensis</i> (Chelot.) ... | ... | | * | |
| " <i>Scutum concavum</i> (Desh.) ... | ... | | * | |
| " <i>seniouvum</i> , Coss. ... | ... | | * | |
| " <i>clypeatum</i> , Coss. ... | ... | | * | |
| " <i>ovatum</i> (Desh.) ... | ... | | * | |
| " <i>radiatum</i> (Desh.) ... | ... | | * | |
| " <i>terminale</i> (Desh.) ... | ... | | * | |
| " <i>elongatum</i> (Lam.) ... | ... | | * | |
| " <i>cælatum</i> (Desh.) ... | ... | | * | |
| " <i>arenarium</i> (Wat.) ... | ... | * | | |
| " <i>angustum</i> (Desh.) ... | ... | | * | |
| " <i>canaliculus</i> (Desh.) ... | ... | | * | |
| " <i>pyramidale</i> (Coss.) ... | ... | | * | |
| " <i>compressum</i> (Desh.) ... | ... | | * | |
| " <i>cymbiola</i> (Desh.) ... | ... | | * | |
| " <i>acuminatum</i> (Desh.) ... | ... | * | | |
| " <i>Scissurella parisiensis</i> , Desh. ... | ... | | * | |
| " <i>Schismope Deshayesi</i> (Mun. Chal.) ... | ... | | * | |
| " <i>Pleurotomaria</i> (<i>Chebloita</i>) <i>concarva</i> , Desh. | ... | | * | |
| " <i>Cyclostrema obsoleta</i> , Coss. ... | ... | | * | |
| " <i>Tinosstoma helicinoides</i> (Lam.) | ... | | * | |
| " <i>umbilicare</i> , Desh. ... | ... | | * | |
| " <i>rotelliforme</i> , Desh. | ... | | * | |
| " <i>elegans</i> , Desh. ... | ... | | * | |
| " <i>priscum</i> , Desh. ... | ... | | * | |
| " <i>mite</i> , Desh. ... | ... | | * | |

| 22. | 23. | 24. |
|---|---|--|
| GASTROPODA. | GASTROPODA. | GASTROPODA. |
| L.L.E. | L.L.E. | L.L.E. |
| L.E. | L.E. | L.E. |
| M.E. | M.E. | M.E. |
| U.E. | U.E. | U.E. |
| [<i>Tinostoma</i>] | <i>Basilissa</i> <i>Boutillieri</i> , Coss. ... | [<i>Phasianella</i>]. |
| " <i>grignonense</i> , Desh. | " <i>sulcata</i> (Lam.) ... | " (<i>Steganomphalus</i>) <i>herouvalensis</i> , Coss. |
| " <i>trigonostoma</i> , Desh. | " <i>Lamarcki</i> (Desh.) ... | " " <i>naticoides</i> , Desh. |
| " <i>marginatula</i> , Desh. | " <i>subelata</i> , D'Orb. ... | <i>Aizyella</i> <i>suessoniensis</i> (Desh.) |
| " <i>complanatum</i> , Desh. | " <i>subfragilis</i> (D'Orb.) ... | <i>Neritopsis</i> <i>parisiensis</i> , Desh. ... |
| " <i>hòdenacense</i> , Coss. | <i>Calliostoma</i> <i>moniliferum</i> (Lam.) | " <i>acutispira</i> , Coss. ... |
| " (<i>Megatybona</i>) <i>Wateleti</i> , Desh | " <i>princeps</i> (Desh.) ... | <i>Nerita</i> <i>granulosa</i> , Desh. ... |
| " <i>dubium</i> (Lam.) ... | " <i>heres</i> (Desh.) ... | " <i>tricarinata</i> , Lam. ... |
| <i>Delphinula</i> <i>Regleyi</i> , Desh. ... | " (<i>Eutrochus</i>) <i>mayvense</i> (Bayan) ... | " <i>pentastoma</i> , Desh. ... |
| " <i>calcar</i> , Lam. ... | " " <i>novatum</i> (Desh.) ... | " <i>Brimonti</i> , Desh. ... |
| " <i>limra</i> , Lam. ... | " <i>Turbo</i> | " <i>semilagiuris</i> , Desh. ... |
| <i>Calliophthalmus</i> <i>squamulosus</i> (Lam.) ... | " (<i>Senectus</i>) <i>sigaretiformis</i> Desh. ... | " (<i>Paloronta</i>) <i>angystoma</i> , Desh. |
| " <i>trochiformis</i> (Desh.) ... | " " <i>radiosus</i> , Lam. ... | " (<i>Odontostoma</i>) <i>manmaria</i> , Lam. ... |
| " <i>crenularis</i> (Desh.) ... | " " <i>herouvalensis</i> , Desh. | " " <i>Baudoni</i> , Coss. |
| <i>Liotia</i> | " (<i>Tectariopsis</i>) <i>Henrici</i> , Caillat. ... | " (<i>Lissochilus</i>) <i>auversiensis</i> , Desh. ... |
| " (<i>Liotina</i>) <i>Gervillei</i> (Defr.) | <i>Leptothyra</i> <i>obtusalis</i> (Baudon) | <i>Neritina</i> <i>subornata</i> , D'Orb ... |
| " " <i>fimbriata</i> (Desh.) | " (<i>Otaulax</i>) <i>inermis</i> (Desh.) | " <i>vicina</i> , Mellev. ... |
| " " <i>Warni</i> (Defr.) ... | <i>Collonia</i> <i>marginata</i> (Lam.) ... | " <i>Laubrieri</i> , Coss. ... |
| <i>Trochus</i> | " <i>infradibulata</i> (Coss.) | " <i>Dutemplei</i> , Desh. ... |
| " (<i>Tectus</i>) <i>subcanaliculatus</i> , Desh. ... | " <i>canalifera</i> (Lam.) ... | " <i>sauvencyensis</i> , Desh. ... |
| " " <i>margaritaceus</i> , Desh. | " <i>spiruloides</i> (Desh.) ... | " <i>globulus</i> , Fér. ... |
| " " <i>mitratus</i> , Desh. | " <i>flammulata</i> , Coss. ... | " <i>consobrina</i> , Fér. ... |
| " " <i>funiculosus</i> , Desh. ... | " <i>rotatoria</i> (Desh.) ... | " <i>zornaria</i> , Desh. ... |
| " " <i>tiara</i> , Defr. | " <i>textiliosa</i> , Coss. ... | " <i>nucleus</i> , Desh. ... |
| " " <i>crenularis</i> , Lam. ... | | |
| " " <i>ornatus</i> , Lam. ... | | |
| | a | a |
| | b | b |
| | c | c |
| | d | d |

| a | b | c | d |
|---|---|---|---|
| <i>Clanculus Ozenni</i> , Crosse ... | | | |
| " (<i>Danilia paristensis</i>) (Desh.) ... | | | |
| <i>Monodonta perelegans</i> , Desh. ... | | | |
| " <i>compsa</i> , Coss. ... | | | |
| <i>Boutillieria Eugeni</i> (Desh.) ... | | | |
| " <i>Bernayi</i> (Bayan) | | | |
| " <i>crassa</i> (Baudon) | | | |
| <i>Gibbula</i> | | | |
| " (<i>Monileta</i>) <i>parnensis</i> , Bayan | | | |
| " " <i>mitis</i> (Desh.) ... | | | |
| " (<i>Pseudodiloma</i>) <i>mirabilis</i> | | | |
| " (Desh.) ... | | | |
| " (<i>Phorcus</i>) <i>sulcata</i> (Lam.) | | | |
| " " <i>distans</i> (Desh.) ... | | | |
| " " <i>fraterculus</i> (Desh.) | | | |
| <i>Norrisia</i> | | | |
| " (<i>Norrisella</i>) <i>pygmaea</i> (Desh.) | | | |
| " " <i>munda</i> (Desh.) ... | | | |
| " " <i>pterochilus</i> , Coss. | | | |
| <i>Simochilus labiosum</i> (Coss.) ... | | | |
| <i>Solarrella odontota</i> (Bayan) ... | | | |
| " <i>trivincta</i> (Desh.) ... | | | |
| " <i>craticulata</i> (Desh.) | | | |
| " <i>bimarginata</i> (Desh.) | | | |
| " <i>filosa</i> , Coss. | | | |
| " <i>simplex</i> (Desh.) ... | | | |
| " <i>trochulus</i> (Desh.) ... | | | |
| " <i>solaritoides</i> (Desh.) | | | |
| <i>Emmargaria felix</i> (Desh.) ... | | | |
| " (<i>Periulax</i>) <i>spirata</i> (Lam.) | | | |
| " " <i>trochiformis</i> (Desh.) | | | |
| " " <i>grata</i> (Desh.) ... | | | |
| " " <i>discreta</i> (Desh.) ... | | | |
| " " (<i>Leucorhynchia</i>) <i>callifera</i> | | | |
| " (Desh.) ... | | | |
| " (<i>Cirsochilus</i>) <i>juncunda</i> | | | |
| " (Desh.) ... | | | |
| " " <i>striata</i> (Lam.) ... | | | |
| " " <i>turbinoides</i> (Lam.) ... | | | |
| " " <i>turbinata</i> (Desh.) ... | | | |
| " " <i>grignonensis</i> (Desh.) | | | |
| " " <i>obsoleta</i> , Coss. ... | | | |
| " " <i>Caillati</i> (Desh.) ... | | | |
| " " <i>cristata</i> (Baudon) ... | | | |
| " " <i>disjuncta</i> (Desh.) ... | | | |
| " " <i>macrostoma</i> (Desh.) ... | | | |
| " (<i>Cyniscella</i>) <i>cornu-pastoris</i> | | | |
| " (Lam.) ... | | | |
| " " <i>Laubrieri</i> , Coss. ... | | | |
| " " <i>separatista</i> (Desh.) | | | |
| " " <i>minutissima</i> (Desh.) | | | |
| " " <i>gonionphalus</i> , Coss. | | | |
| " (?) <i>Rigaulti</i> (Desh.) | | | |
| <i>Eucyclus juncundus</i> (Desh.) ... | | | |
| " <i>Bezauconi</i> (Coss.) ... | | | |
| <i>Phasianella</i> | | | |
| " (<i>Tricolia</i>) <i>dissimilis</i> , Desh. | | | |
| " <i>Lamarcki</i> , Desh. ... | | | |
| " <i>Dunkeri</i> , Desh. ... | | | |
| " " <i>Laubrieri</i> , Coss. | | | |
| " " <i>turbinoides</i> , Lam. | | | |
| " " <i>semistriata</i> , Lam. | | | |
| " " <i>tenuistriata</i> , Desh. | | | |
| " " <i>succineopsis</i> , Coss. | | | |
| " (<i>Steganophalus</i>) <i>picta</i> , Desh. | | | |
| " " <i>partistensis</i> , D'Orb. | | | |
| " " (<i>Bowryi</i> , Coss. ... | | | |
| " " <i>lincolata</i> , Desh. ... | | | |
| " " <i>Fassyi</i> , Desh. ... | | | |
| " <i>Velates Schmideli</i> (Chem.) ... | | | |
| " <i>equinus</i> (Bezauçon) ... | | | |
| " <i>Tomostoma neritoides</i> (Desh.) | | | |
| " <i>rostratum</i> , Coss. ... | | | |
| <i>Ceres</i> | | | |
| " (<i>Dimorphophychia</i>) <i>Arnouldi</i> | | | |
| " (Michaud) ... | | | |
| <i>Pyramidella catvimontensis</i> , | | | |
| Desh. ... | | | |
| " <i>terebelata</i> , Fér. | | | |
| " <i>inaspecta</i> , Desh. | | | |
| <i>Syrnola Bernayi</i> , Coss. | | | |
| " <i>nitida</i> (Mellév.) ... | | | |
| " <i>polygyrata</i> (Desh.) ... | | | |
| " <i>praxlonga</i> (Desh.) ... | | | |
| " <i>spina</i> (Desh.) ... | | | |
| " <i>microstoma</i> (Desh.) ... | | | |
| " <i>spicatum</i> (Desh.) ... | | | |
| " <i>angusta</i> (Desh.) ... | | | |
| " <i>arcta</i> (Desh.) ... | | | |
| " <i>parva</i> (Desh.) ... | | | |
| " <i>acicula</i> (Lam.) | | | |
| " <i>climacina</i> , Coss. | | | |
| " <i>ruellensis</i> (De Rainc.) | | | |
| " <i>Barreti</i> (Morlet) | | | |
| " <i>obesula</i> (Desh.) ... | | | |
| " <i>goniophora</i> , Coss. ... | | | |
| " <i>carinulata</i> , Coss. ... | | | |
| " (<i>Orina</i>) <i>umbilicata</i> | | | |
| " (Desh.) | | | |

| 25. GASTROPODA. | | L.F.E. | L.F. | M.F. | U.F. | 26. GASTROPODA. | | L.F.E. | L.F. | M.F. | U.F. | 27. GASTROPODA. | | L.F.E. | L.F. | M.F. | U.F. |
|---|----------------------------|--------|------|------|------|---|----------|----------|----------|----------|----------|--|------------------|----------|----------|----------|----------|
| <i>Synvala</i> | | | | | | [<i>Eulima</i>] | | | | | | | [<i>Scala</i>] | | | | |
| " (<i>Diptychus</i>) <i>clandestina</i> | (Desh.)... | | * | * | * | " (<i>Subularia</i>) <i>acumula</i> , | Desh.... | | * | * | * | " (<i>Pliciscala</i>) <i>Levesquei</i> (De | | | | | |
| " " | <i>emarginata</i> , Coss. | | | | | " <i>distorta</i> (Detr.) ... | | | | | | " (<i>Dentiscala</i>) <i>marginosoma</i> | | | | | |
| " " | <i>eburnea</i> (Desh.) | | * | * | * | " <i>angustata</i> , Desh.... | | | | | | " (Baudon)... | | | | | |
| " " | <i>misera</i> (Desh.)... | | * | * | * | " <i>concinna</i> , Desh.... | | | | | | " (<i>Crassiscala</i>) <i>Francisci</i> | | | | | |
| " " | <i>speciosa</i> (Desh.) | | | | | " <i>herovalensis</i> (Coss.) | | | | | | " (Caillat)... | | | | | |
| " " | <i>pupoides</i> , Coss.... | | | | | " (<i>Margineulima</i>) <i>fallax</i> , Desh. | | | | | | " <i>variculosa</i> (Desh.) | | | | | |
| " (<i>Loxophyxis</i>) <i>conulus</i> , Coss. | | | | | | " (?) <i>Barreti</i> (Morlet) | Desh. | | | | | " <i>plicata</i> (Lam.) ... | | | | | |
| <i>Odontostomia</i> <i>Deshayesi</i> (Br. & Corn.)... | | | * | * | * | <i>Stylifer</i> <i>pellucidus</i> (Desh.) ... | | | | | | " <i>Chevallieri</i> (Coss.) | | | | | |
| " <i>turbonilloides</i> , Desh. | | | | | | " <i>propinquus</i> , Coss. ... | | | | | | " <i>acanthodes</i> (Coss.) | | | | | |
| " <i>hordeola</i> (Lam.) ... | | | * | * | * | " <i>eulimoides</i> , Coss. ... | | | | | | <i>Canaliscala</i> <i>heteromorpha</i> | | | | | |
| " <i>modesta</i> , Desh. ... | | | * | * | * | <i>Niso</i> <i>terebellata</i> (Lam.) ... | | | | | | " (<i>Desh.</i>)... | | | | | |
| " <i>pyramis</i> , Desh. ... | | | | | | " <i>angusta</i> , Desh. ... | | | | | | <i>Tenuiscala</i> <i>Laubrierei</i> , De | | | | | |
| " <i>subvaricosa</i> , Desh. | | | | | | " <i>constricta</i> , Desh. | | | | | | " Boury... | | | | | |
| " <i>intermedia</i> , Desh.... | | | | | | <i>Scala</i> | | | | | | " <i>Michelin</i> (Desh.) ... | | | | | |
| " <i>obliqua</i> (Desh.) ... | | | * | * | * | " (<i>Crisposcala</i>) <i>crispa</i> (Lam.) | | | | | | " <i>Ramondi</i> , De Boury | | | | | |
| " <i>tortilis</i> , Desh. ... | | | * | * | * | " <i>plestomorpha</i> (De Boury) | | | | | | " <i>anabitis</i> , De Boury .. | | | | | |
| " <i>macrophyxis</i> , Coss. | | | | | | " <i>tenuilamella</i> (Desh.) ... | | | | | | " (<i>Cerithiscala</i>) <i>primula</i> | | | | | |
| " <i>Gravesi</i> , Desh. ... | | | | | | " <i>junctilamella</i> (De Boury) | | | | | | " (<i>Desh.</i>)... | | | | | |
| " <i>nematurella</i> , Morlet | | | | | | " <i>Dadanti</i> (De Boury) ... | | | | | | " <i>Munieri</i> (De Rainc.) | | | | | |
| " <i>nisoides</i> , Coss. ... | | | * | * | * | " <i>Godini</i> (De Boury) ... | | | | | | " <i>Clebezi</i> , De Boury ... | | | | | |
| " <i>mediana</i> , Desh. ... | | | | | | " <i>acuminensis</i> (De Boury) | | | | | | <i>Foratiscala</i> <i>cerithiformis</i> | | | | | |
| " <i>primæva</i> , Desh. ... | | | | | | " <i>Barrandei</i> (Desh.) ... | | | | | | " (Wat.)... | | | | | |
| " <i>nana</i> , Desh. | | | * | * | * | " <i>aizyensis</i> (Desh.) ... | | | | | | " <i>sculptata</i> (Desh.) | | | | | |
| " <i>lignitarum</i> , Desh.... | | | * | * | * | " <i>Johanne</i> (De Boury)... | | | | | | " <i>mesaitopsis</i> , Coss. | | | | | |
| " <i>minor</i> , Desh. ... | | | * | * | * | " <i>chaussyensis</i> (De Boury) | | | | | | <i>Actirsa</i> <i>auerstensis</i> (Desh.)... | | | | | |
| | | | | | | | | <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | | | <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> |

| | a | b | c | d |
|---|---|---|---|---|
| " <i>limæiformis</i> , Coss. | | | | |
| " <i>verneuiliensis</i> , De R. & M. C. | | | | |
| " <i>lubrica</i> , Desh. | * | | * | |
| " <i>mitiola</i> (Lam.) | * | | * | |
| " <i>bulimoides</i> , Desh. | * | | * | |
| " <i>Lapparenti</i> , De Raine. | * | | * | |
| <i>Eulimella inornata</i> (Desh.) | * | | * | |
| " (<i>Anisocycla gracilis</i>) (Desh.) | * | | * | |
| " <i>polygyrata</i> (Desh.) | * | | * | |
| " <i>scalarina</i> (Desh.) | * | | * | |
| <i>Murchisoniella emarginata</i> (Desh.) | * | | * | |
| <i>Discobasis demissa</i> (Desh.) | * | | * | |
| <i>Turbonilla compta</i> , Desh. | * | | * | |
| " <i>turrella</i> (Mellew.) | * | | * | |
| " <i>pulchra</i> , Desh. | * | | * | |
| " <i>notata</i> , Desh. | * | | * | |
| " <i>tenuiplicata</i> , Desh. | * | | * | |
| " <i>submarginata</i> , Desh. | * | | * | |
| " <i>fragilis</i> , Desh. | * | | * | |
| " <i>Morleti</i> , Coss. | * | | * | |
| " <i>suturalis</i> , Coss. | * | | * | |
| <i>Eulima turgidula</i> , Desh. | * | | * | |
| " <i>submarginata</i> , Desh. | * | | * | |
| " (<i>Subularia nitida</i>) (Lam.) | * | | * | |
| " <i>subnitida</i> , D'Orb. | * | | * | |
| " <i>goniophora</i> , Coss. | * | | * | |
| " <i>munida</i> , Desh. | * | | * | |
| " <i>spinula</i> , Coss. | * | | * | |
| " <i>acumen</i> , Desh. | * | | * | |
| " <i>subimbricata</i> , Coss. | * | | * | |
| " <i>rectilabrum</i> , Coss. | * | | * | |
| " <i>Deshayesi</i> , Coss. | * | | * | |
| " <i>acutilamelia</i> (De Boury) | | | * | |
| " <i>condensata</i> (De Boury) | | | * | |
| " (<i>Circuloscala Rogeri</i>) (De Boury) | | | * | |
| " <i>brevicula</i> (Desh.) | | | * | |
| " (<i>Parviscala Baudouin</i>) (De Boury) | | | * | |
| " <i>Loustaue</i> (De Boury) | | | * | |
| " (<i>Cirsotrema elegantissima</i>) (Desh.) | | | * | |
| " <i>acuta</i> (Sow.) | | | * | |
| " <i>Morleti</i> (De Boury) | | | * | |
| " <i>Bourdouii</i> (De Boury) | | | * | |
| " <i>contabulata</i> (Desh.) | | * | * | |
| " <i>ruellensis</i> (De Boury) | | | * | |
| " (<i>Bifidoscala Lemoinei</i>) (De Boury) | | | * | |
| " (<i>Coniscala Boverbanki</i>) (Mor.) | * | | * | |
| " (<i>Acrilla gallica</i>) (De Boury) | * | | * | |
| " <i>essomiensis</i> (De Boury) | * | | * | |
| " <i>Lamberti</i> (Desh.) | * | | * | |
| " <i>affinis</i> (Desh.) | * | | * | |
| " <i>grignonensis</i> (De Boury) | * | | * | |
| " <i>semicostata</i> (Sow.) | * | | * | |
| " <i>Deslongchampsii</i> (De R. & M. C.) | * | | * | |
| " <i>fayellensis</i> (De Boury) | * | | * | |
| " <i>reticulata</i> (Sol.) | * | | * | |
| " <i>angusta</i> (Desh.) | * | | * | |
| " <i>cuisensis</i> (De Boury) | * | | * | |
| " (<i>Pliciscala Gouldi</i>) (Desh.) | * | | * | |
| " <i>Lamarcki</i> (Desh.) | * | | * | |
| " <i>Bezanconi</i> , De Boury | * | | * | |
| " <i>funiculosa</i> , Coss. | * | | * | |
| " <i>subplicata</i> (Desh.) | * | | * | |
| " <i>primæva</i> , De Boury | * | | * | |
| " (<i>Acirsella inermis</i>) (Desh.) | * | | * | |
| " <i>transversaria</i> (Desh.) | * | | * | |
| " <i>striatula</i> , Desh. | * | | * | |
| " <i>erasa</i> (Desh.) | * | | * | |
| <i>Littoriniscala Lapparenti</i> , De Boury | * | | * | |
| " <i>asperina</i> , Coss. | * | | * | |
| " <i>Actis eocentica</i> (De Boury) | * | | * | |
| " <i>minutissima</i> (Desh.) | * | | * | |
| " <i>Eugeni</i> (Desh.) | * | | * | |
| " <i>Bouryi</i> , Coss. | * | | * | |
| " <i>Adeorbis Fischeri</i> , Desh. | * | | * | |
| " <i>lucidus</i> , Coss. | * | | * | |
| " <i>politus</i> , Edw. | * | | * | |
| " <i>levigatus</i> (Desh.) | * | | * | |
| " <i>tenustriatus</i> , Desh. | * | | * | |
| " <i>Michaudi</i> , Desh. | * | | * | |
| " <i>senistriatus</i> , Desh. | * | | * | |
| " <i>Rangi</i> , Desh. | * | | * | |
| " <i>nitidus</i> , Desh. | * | | * | |
| " <i>planorbularis</i> (Desh.) | * | | * | |
| " <i>intermedius</i> , Desh. | * | | * | |
| " <i>similis</i> , Desh. | * | | * | |
| " <i>bicarinatus</i> (Lam.) | * | | * | |
| " <i>propinquus</i> , Desh. | * | | * | |
| " <i>labiosus</i> , Coss. | * | | * | |
| " <i>rota</i> , Desh. | * | | * | |
| " <i>quinguecinctus</i> , Coss. | * | | * | |
| " <i>tricosatus</i> (Desh.) | * | | * | |

| a | b | c | d |
|---|---|---|---|
| " <i>Lorioli</i> , Desh. | * | * | * |
| " <i>Hamiltoni</i> , Desh. | * | * | * |
| " <i>venusta</i> , Desh. | * | * | * |
| " <i>tenuicula</i> , Desh. | * | * | * |
| " <i>consobrina</i> , Desh. | * | * | * |
| " <i>Blainvillæ</i> , Desh. | * | * | * |
| " <i>labellata</i> , Lam. | * | * | * |
| " <i>pilula</i> , Desh. | * | * | * |
| " <i>ambulacrum</i> , Sow. | * | * | * |
| " <i>Brongniarti</i> , Desh. | * | * | * |
| " <i>viviparoides</i> , Coss. | * | * | * |
| " <i>pseudochmar</i> , Coss. | * | * | * |
| " (<i>Sigaretopsis</i>) <i>infundibulum</i> , Wat. | * | * | * |
| " <i>Woodi</i> , Desh. | * | * | * |
| " <i>Sigaretus clathratus</i> (Gm.) | * | * | * |
| " <i>Levesqueti</i> , Recluz | * | * | * |
| " <i>politus</i> , Desh. | * | * | * |
| " (?) <i>pellucidus</i> , Desh. | * | * | * |
| " <i>Eunaticina Gouldi</i> , Recluz | * | * | * |
| " <i>Ampullina sigaretina</i> (Lam.) | * | * | * |
| " <i>splendida</i> (Desh.) | * | * | * |
| " <i>patula</i> (Lam.) | * | * | * |
| " <i>semipatula</i> (Desh.) | * | * | * |
| " <i>aizeyensis</i> (Bayan) | * | * | * |
| " <i>parisiensis</i> (D'Orb.) | * | * | * |
| " <i>depressa</i> (Lam.) | * | * | * |
| " <i>alsconitula</i> (Desh.) | * | * | * |
| " <i>Forbesi</i> (Desh.) | * | * | * |
| " <i>Gouberli</i> (Desh.) | * | * | * |
| " <i>Ettwardsi</i> (Desh.) | * | * | * |
| " <i>grossa</i> (Desh.) | * | * | * |
| " <i>rustica</i> (Desh.) | * | * | * |
| " (<i>Macromphalina</i>) <i>probleu-</i> <i>atica</i> (Desh.) | * | * | * |
| " <i>decussata</i> , Coss. | * | * | * |
| " (<i>Dialytostoma</i>) <i>Fischeri</i> (De Laub.) | * | * | * |
| " <i>disjuncta</i> (De R. & M. C.) | * | * | * |
| " <i>subsoluta</i> (Coss.) | * | * | * |
| " (<i>Micromphalina</i>) <i>elegans</i> (Desh.) | * | * | * |
| " <i>cliona</i> (De R. & M. C.) | * | * | * |
| " <i>terrestralis</i> (Coss.) | * | * | * |
| " (?) <i>scalariformis</i> (Morlet) | * | * | * |
| " <i>Cymenorytis fragilis</i> (Lam.) | * | * | * |
| " <i>undulata</i> (Desh.) | * | * | * |
| " <i>conica</i> , Coss. | * | * | * |
| " <i>densisulcata</i> , Coss. | * | * | * |
| " <i>Lacunarina macrostoma</i> (Desh.) | * | * | * |
| " <i>Xenophora cumulans</i> (Brong.) | * | * | * |
| " (<i>Tugurium</i>) <i>agglutinans</i> (Lam.) | * | * | * |
| " <i>Gravesi</i> (D'Orb.) | * | * | * |
| " <i>nummullifera</i> , Desh. | * | * | * |
| " (<i>Haliphobus</i>) <i>patellata</i> (Desh.) | * | * | * |
| " <i>Bouryi</i> , Coss. | * | * | * |
| " <i>Capulus singularis</i> (Desh.) | * | * | * |
| " <i>dilatatus</i> (Desh.) | * | * | * |
| " <i>pennatus</i> (Lam.) | * | * | * |
| " <i>patulus</i> (Desh.) | * | * | * |
| " <i>squamiformis</i> (Lam.) | * | * | * |
| " <i>Dutempli</i> (Desh.) | * | * | * |
| " <i>Morleti</i> , Coss. | * | * | * |
| " <i>Craspedopoma conoideum</i> (Boissy) | * | * | * |
| " <i>insuetum</i> (Desh.) | * | * | * |
| " <i>Matheroni</i> (Desh.) | * | * | * |
| " <i>Dissostoma nummia</i> , Lam. | * | * | * |
| " <i>sparnacense</i> , Desh. | * | * | * |
| " <i>Megalomatostoma Arnouldi</i> (Michaud) | * | * | * |
| " <i>entyrhysis</i> , Coss. | * | * | * |
| " <i>Hartmannia modica</i> (Desh.) | * | * | * |
| " <i>parvula</i> (Desh.) | * | * | * |
| " <i>ressonensis</i> (De Rainc.) | * | * | * |
| " <i>proxima</i> (Coss.) | * | * | * |
| " <i>Assimineæ conica</i> (C. Prevost) | * | * | * |
| " <i>contracta</i> , Coss. | * | * | * |
| " <i>crassa</i> (Desh.) | * | * | * |
| " <i>glandinensis</i> (De L. & C.) | * | * | * |
| " <i>crassilabris</i> (Desh.) | * | * | * |
| " <i>goniophora</i> (Morlet) | * | * | * |
| " <i>stenochoira</i> , Coss. | * | * | * |
| " <i>eburnoides</i> , Coss. | * | * | * |
| " <i>laevata Leopoldi</i> , Boissy <i>inflexa</i> , Desh. | * | * | * |
| " (<i>Cinctina</i>) <i>Michaudi</i> , Desh. | * | * | * |
| " <i>Trigleri</i> , Desh. | * | * | * |
| " <i>parvula</i> , Desh. | * | * | * |
| " <i>Bezanconi</i> , De L. & C. | * | * | * |
| " <i>Bouryi</i> , Coss. | * | * | * |
| " <i>Viviparus aspersus</i> (Michaud) | * | * | * |

| | | |
|--|---|--|
| <i>Bouryi</i> , Coss. | <i>Houdasi</i> , Coss. | <i>tricostalis</i> (Desh.) ... |
| <i>Sellia pulchra</i> , De Rainc. | (<i>Zebinella</i>) <i>cochlearella</i> (Lam.) ... | <i>subangulata</i> , Desh. ... |
| <i>Bithinella pulchra</i> (Desh.) ... | <i>discreta</i> , Desh. ... | <i>melanoides</i> (Desh.) ... |
| " <i>mutata</i> , Coss. | " <i>plicatilis</i> , Desh. ... | <i>Deshyesi</i> , Coss. ... |
| " <i>expulsa</i> (Desh.) ... | " <i>punctulata</i> , Desh. ... | <i>Bernayi</i> , Coss. ... |
| " <i>pupina</i> (Desh.) ... | " <i>polita</i> (Desh.) ... | <i>incompleta</i> , Desh. ... |
| " <i>atomus</i> (Brongn.) ... | " <i>lavigatissima</i> , Desh. ... | <i>mitis</i> , Desh. ... |
| " <i>circosphora</i> , Coss. | " <i>semistriata</i> (Lam.) ... | <i>variculosa</i> , Desh. ... |
| " <i>intermedia</i> (Mellev.) ... | (<i>Zebina</i>) <i>Schwartzi</i> , Desh. ... | <i>rissoides</i> , Desh. ... |
| " <i>alta</i> (Desh.) ... | " <i>jallax</i> , Desh. ... | " (<i>Prosthenodon</i>) <i>monodon</i> , Desh. ... |
| " <i>sphaeroidalis</i> , Coss. | " <i>pygmaea</i> , Coss. ... | <i>Risella minuta</i> (Desh.) ... |
| " (<i>Larletia</i>) <i>cochlearia</i> (Desh.) ... | " <i>paludiformis</i> (Desh.) ... | <i>Cavilabium Bezanconi</i> (Coss.) ... |
| " (<i>Dieretostoma</i>) <i>dissita</i> (Desh.) ... | (?) <i>dactylosa</i> (Desh.) ... | <i>Lacuna macromphalus</i> , Morlet ... |
| <i>Lapparentia irregularis</i> (Desh.) ... | <i>Chevalieria labrosa</i> , Coss. ... | " <i>craspedomphalus</i> , Coss. ... |
| <i>Fischeri</i> , Berthelin ... | " <i>ambigua</i> , Coss. ... | <i>Wateleti</i> , Coss. ... |
| <i>Tomichia Desmaresti</i> (Prevost) ... | " <i>minuta</i> (Desh.) ... | <i>anomala</i> , Coss. ... |
| " <i>imbata</i> (Desh.) ... | <i>numiola</i> , Coss. ... | " (<i>Epheria</i>) <i>compressa</i> , Coss. ... |
| <i>Bithinia Dovilloti</i> , Bayan ... | <i>Paryphostoma turricula</i> (Brug.) ... | " <i>Loustani</i> , Desh. ... |
| " <i>Nysti</i> (Boissy) ... | " <i>minus</i> (Desh.) ... | " <i>mirabilis</i> , Desh. ... |
| " <i>oxyptira</i> , Coss. ... | " <i>decemviratum</i> , Coss. ... | " <i>Dutemplei</i> , Desh. ... |
| " <i>pygmaea</i> , Desh. ... | " <i>eximium</i> (Desh.) ... | " <i>globulosa</i> , Desh. ... |
| " <i>Sandbergeri</i> , Desh. ... | " <i>plicatulum</i> (Desh.) ... | " <i>cusensis</i> , Coss. ... |
| " <i>Duchasteli</i> , Nyst ... | <i>Litopa acuminata</i> (Baudon) ... | " <i>nitidissima</i> , Coss. ... |
| " <i>Stenothyra pulvis</i> (Desh.) ... | <i>Solarium Picteti</i> , Desh. ... | " <i>amaura</i> , Coss. ... |
| " <i>chlorista</i> , Coss. ... | " <i>bistriatum</i> , Desh. ... | " <i>nilens</i> , Desh. ... |
| " <i>globulus</i> (Desh.) ... | " <i>patulum</i> , Lam. ... | " <i>pulchella</i> , Desh. ... |
| " <i>mediana</i> (Desh.) ... | " <i>cabrimontense</i> , Desh. ... | " <i>Langlassei</i> , De Rainc. ... |
| " <i>microscopica</i> (Coss.) ... | " <i>subgranulatum</i> , D'Orb. ... | " <i>aperta</i> , Coss. ... |
| | " <i>canaliculatum</i> , Lam. ... | " <i>euridyctyum</i> , Coss. ... |
| | " <i>Gaudryi</i> , Morlet ... | " <i>sigaretina</i> , Desh. ... |
| | " <i>crenulata</i> , Desh. ... | " <i>fragilis</i> , Desh. ... |
| | " <i>plicatulum</i> , Desh. ... | |

| 34. GASTROPODA. | | L.L.F. | L.F. | M.F. | U.F. | 35. GASTROPODA. | | L.L.F. | L.F. | M.F. | U.F. | 36. GASTROPODA. | | L.L.F. | L.F. | M.F. | U.F. |
|---|--|--------|------|------|------|---|-----|----------|----------|----------|----------|--------------------|---|----------|----------|----------|----------|
| [<i>Lacuna</i>] | | | | | | <i>Bayania lactea</i> (Lam.) | ... | | | | | | [<i>Mesalia</i>] | | | | |
| " (<i>Meduriopsis</i>) <i>effusa</i> , Desh. | | | | | | " <i>sulpiriensis</i> (Desh.) | ... | | | | | | " <i>melanoides</i> (Desh.) | | | | |
| " <i>pachnidiformis</i> , Desh. | | | | * | | " <i>trivacca</i> (Fér.) | ... | * | | | | | " <i>fasciata</i> (Lam.) | | * | | |
| " <i>minutissima</i> , Desh. | | | | * | | " <i>deltibata</i> (Desh.) | ... | * | | | | | " <i>solida</i> (Desh.) | | * | | |
| " <i>actæonoides</i> , Coss. | | | | * | | " <i>serpuncta</i> (Desh.) | ... | | | | | | " <i>multisulcata</i> (Lam.) | | * | | |
| " <i>aratala</i> , Coss. | | | | * | | " <i>herovalensis</i> (Desh.) | ... | | | | | | " <i>consobrina</i> (Desh.) | | * | | |
| " <i>cochlearella</i> , Coss. | | | | * | | " <i>Laubrieri</i> , Coss. | ... | * | | | | | " <i>brachyletes</i> (Bayan) | | * | | |
| " (<i>Entomope</i>) <i>Klipsteini</i> | | | | | | " <i>ventriculosa</i> (Desh.) | ... | * | | | | | " <i>trochoides</i> (Desh.) | | * | | |
| " (Coss.) | | | | * | | " <i>Bourdoti</i> , Coss. | ... | * | | | | | " <i>sulcata</i> (Lam.) | | * | | |
| " <i>Loveni</i> , Bayan | | | | * | | " <i>minutissima</i> (Desh.) | ... | * | | | | | " <i>Helignostoma nitidulum</i> | | * | | |
| " <i>bulinopsis</i> , Desh. | | | | * | | " <i>substriata</i> (Desh.) | ... | * | | | | | " (Desh.) | | * | | |
| " <i>Cherwalleri</i> , Coss. | | | | * | | " <i>vetusta</i> (Desh.) | ... | * | | | | | " <i>Malhildia Baylei</i> , De Boury | | * | | |
| " (<i>Lacunella</i>) <i>depressa</i> , Desh. | | | | * | | " <i>sulcata</i> (Desh.) | ... | * | | | | | " <i>Bourdoti</i> , De Boury | | * | | |
| " <i>bulimoides</i> , Desh. | | | | * | | " <i>hordacea</i> (Lam.) | ... | * | | | | | " <i>Cossmanni</i> , De Boury | | * | | |
| " (<i>Cirsope</i>) <i>margmata</i> , Desh. | | | | * | | " <i>semicostellata</i> (Desh.) | ... | * | | | | | " <i>Crossii</i> , De Boury | | * | | |
| " <i>Bouyi</i> , Coss. | | | | * | | " <i>nixta</i> (Desh.) | ... | * | | | | | " <i>Morgani</i> , De Boury | | * | | |
| <i>Dissochilus heterogæneum</i> | | | | | | " <i>varians</i> (Desh.) | ... | * | | | | | " <i>impar</i> (Desh.) | | * | | |
| " (Desh.) | | | | | | " <i>fibula</i> (Desh.) | ... | * | | | | | " <i>costellata</i> (Desh.) | | * | | |
| " <i>conicum</i> (Coss.) | | | | | | " <i>pupiformis</i> , Morlet | ... | * | | | | | " <i>Raincourti</i> , De Boury | | * | | |
| " <i>Lacunodon Bernayi</i> , Coss. | | | | * | | " <i>canicularis</i> (Lam.) | ... | * | | | | | " <i>Morleti</i> , De Boury | | * | | |
| " <i>reflexilabrum</i> , Coss. | | | | * | | " <i>subtenuisiriata</i> | ... | * | | | | | " <i>turritellata</i> (Lam.) | | * | | |
| " (<i>Lacunophyxis</i>) <i>prælonga</i> (Desh.) | | | | * | | " <i>essoniensis</i> , Coss. | ... | * | | | | | " <i>Bezancovi</i> , De Boury | | * | | |
| <i>Melania</i> | | | | | | " (<i>D'Orb.</i>) | ... | * | | | | | " <i>tenuisculpta</i> , De Boury | | * | | |
| " (<i>Melanoides</i>) <i>inquinata</i> , Detr. | | | | * | | " <i>Cæcum</i> | ... | * | | | | | " (<i>Acrocælum</i>) <i>Bouyi</i> , Coss. | | * | | |
| " <i>præcessa</i> , Desh. | | | | * | | " (<i>Strebboceras</i>) <i>lituus</i> , Desh. | ... | * | | | | | " <i>vincta</i> (Desh.) | | * | | |
| " <i>Balanochelis lucida</i> (Coss.) | | | | * | | " <i>Bezancovi</i> , Coss | ... | * | | | | | " <i>Truba sulcata</i> (Pilk.) | | * | | |
| " <i>berrellensis</i> (De Laub. | | | | * | | " <i>Thecopsella Fischeri</i> , Mun.Chal. | ... | * | | | | | " <i>cyclotomoides</i> (Desh.) | | * | | |
| and Carez) | | | | * | | " <i>Euchilotheca succincta</i> (Detr.) | ... | * | | | | | " <i>Scaiola Bouryi</i> , Coss. | | * | | |
| | | | | | | | | <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | | | <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> |

| | a | b | c | d |
|--|---|---|---|---|
| " <i>euimoides</i> , Coss. | | | | |
| " <i>Semisinus resectus</i> (Desh.) | | | | |
| " <i>Faunus Lanarcki</i> (Desh.) | | | | |
| " <i>Suzanna</i> (D'Orb.) | | | | |
| " <i>ceritiformis</i> (Wat.) | * | | | |
| " <i>dispar</i> (Desh.) | | | | |
| " <i>Haranti</i> (De Laub. and Carez) | | | | |
| " <i>clavosus</i> , Lam. | | | | |
| " (<i>Melanatria</i>) <i>Civieri</i> (Desh.) | | | | |
| " <i>vulcanicus</i> (Schl.) | | | | |
| " <i>Dufresnei</i> (Desh.) | | | | |
| " <i>curvicastratus</i> (Mellv.) | | | | |
| " <i>ornatus</i> (Desh.) | | | | |
| " (<i>Pirenopsis</i>) <i>rissouiformis</i> , Coss. | | | | |
| " <i>Melanopsis buccinoides</i> , Fér. | | | | |
| " <i>ancillaroides</i> , Desh. | | | | |
| " <i>Lanbrerei</i> , Carez. | | | | |
| " <i>buccinulum</i> , Desh. | | | | |
| " <i>sotalis</i> , Desh. | | | | |
| " <i>ovularis</i> , Desh. | | | | |
| " <i>lactacea</i> , Coss. | | | | |
| " <i>Mausseneti</i> , Coss. | | | | |
| " (<i>Macropsira</i>) <i>proboscidea</i> , Desh. | | | | |
| " (<i>Cyptostylus</i>) <i>Parkinsoni</i> , Desh. | | | | |
| " <i>obtusata</i> , Desh. | | | | |
| " <i>Paludomus Vauillei</i> (Coss.) | | | | |
| " <i>Bouryia polygyrata</i> , Coss. | | | | |
| " <i>convexuscula</i> , Coss. | | | | |
| <i>Turrite</i> <i>la terebellata</i> , Lam. | | | | |
| " <i>sulcifera</i> , Desh. | | | | |
| " <i>hybrida</i> , Desh. | | | | |
| " <i>carinifera</i> , Desh. | | | | |
| " <i>imbricata</i> , Lam. | | | | |
| " <i>adulterata</i> , Desh. | | | | |
| " <i>elegans</i> , Desh. | | | | |
| " <i>bellocacensis</i> , Desh. | | | | |
| " <i>Solanderi</i> , May. Eym. | | | | |
| " <i>granulosa</i> , Desh. | | | | |
| " <i>monilifera</i> , Desh. | | | | |
| " <i>Lanarcki</i> , Defr. | | | | |
| " <i>marginalata</i> , Mellv. | | | | |
| " <i>subtila</i> , Desh. | | | | |
| " <i>funiculosa</i> , Desh. | | | | |
| " <i>mitis</i> , Desh. | | | | |
| " <i>compta</i> , Desh. | | | | |
| " <i>interposita</i> , Desh. | | | | |
| " <i>elongata</i> , Sow. | | | | |
| " <i>copiosa</i> , Desh. | | | | |
| " <i>circundata</i> , Desh. | | | | |
| " <i>Vaudini</i> , Desh. | | | | |
| " <i>Caillati</i> , Desh. | | | | |
| " <i>uniusularis</i> , Lam. | | | | |
| " <i>uniusulcata</i> , Lam. | | | | |
| " <i>cuisensis</i> , Coss. | | | | |
| " <i>Mesalia regularis</i> (Desh.) | | | | |
| " <i>Ecki</i> (De Laub.) | | | | |
| " <i>intermedia</i> (Desh.) | | | | |
| " <i>incerta</i> (Desh.) | | | | |
| " <i>Heberti</i> (Desh.) | | | | |
| " <i>turbinoides</i> (Desh.) | | | | |
| " <i>Wateleti</i> (Desh.) | | | | |
| <i>Vermetus</i> (<i>Serpulor-bis</i>) <i>cancellatus</i> (Desh.) | | | | |
| " <i>ornatus</i> , Desh. | | | | |
| " <i>strictus</i> , Desh. | | | | |
| " <i>Morchi</i> , Desh. | | | | |
| " <i>clathratus</i> , Desh. | | | | |
| " <i>cristatus</i> , Desh. | | | | |
| " <i>laxatus</i> , Desh. | | | | |
| " <i>sempedalus</i> , Desh. | | | | |
| " <i>porrectus</i> , Desh. | | | | |
| " <i>serpuloides</i> , Desh. | | | | |
| " <i>angulinus</i> , Desh. | | | | |
| " <i>polygonus</i> , Desh. | | | | |
| " (<i>Vermicularia</i>) <i>conicus</i> (Lam.) | | | | |
| " <i>biangulatus</i> (Desh.) | | | | |
| " <i>suessoniensis</i> , De Laub. | | | | |
| " <i>Tenagodes</i> | | | | |
| " (<i>Agathirses</i>) <i>striatus</i> (Defr.) | | | | |
| " <i>sulcatus</i> (Defr.) | | | | |
| " <i>Faujasi</i> (Desh.) | | | | |
| " <i>spinosus</i> (Desh.) | | | | |
| " <i>lima</i> (Lam.) | | | | |
| " (<i>Pyripoma</i>) <i>multistriatus</i> (Defr.) | | | | |
| " <i>brevifassuratus</i> (Desh.) | | | | |
| " <i>mitis</i> (Desh.) | | | | |
| " <i>gracilis</i> (Desh.) | | | | |
| " <i>Cerithioderma pulchrum</i> (Desh.) | | | | |
| " <i>angulatum</i> (Desh.) | | | | |
| " <i>gratum</i> (Desh.) | | | | |

| 37. | | 38. | | 39. | | | | |
|---|----------|------------|----------|----------|---|----------|----------|----------|
| GASTROPODA. | L.L.E. | L.B. | M.E. | U.E. | L.L.E. | L.B. | M.E. | U.E. |
| [<i>Cerithioderma</i>] | | | | | [<i>Cerithiopsis</i>] | | | |
| " <i>cancelloaroides</i> (M.-Ilev.) | | | | | " <i>dulcicula</i> (Desh.)... | | | |
| " <i>Planaxis Fischeri</i> , De Rainc.... | | * | | * | " <i>Philippardi</i> (Wat.) | * | | * |
| " <i>antiacrophorus</i> , Coss.... | | | | | " <i>parcostata</i> (Wat.) | * | | * |
| " (<i>Orthochilus</i>) <i>Bezancon</i> | | | | | " <i>Escheri</i> (Desh.) ... | | | |
| (De Rainc.)... | | | | | " <i>Laecocheilus inelyta</i> (Desh.) ... | | | |
| " <i>denuclatus</i> , Coss.... | | | * | * | " <i>Loustanae</i> , Coss.... | | | |
| " <i>Brachytrema muricoides</i> (Lam.) | | | * | * | " <i>Chevallieri</i> , Coss.... | | | |
| " <i>brevicolum</i> (Desh.)... | | | * | * | " <i>Passyni</i> (Desh.) ... | | | |
| " <i>acutidens</i> (Desh.) ... | | * | * | * | " <i>affinis</i> (Desh.) ... | | | |
| " <i>carinulatum</i> (Desh.) | | | * | * | " <i>Cerithiella clavus</i> (Lam.) ... | | | |
| " <i>Cerithium serratum</i> , Brug. ... | | | * | * | " <i>accedens</i> (Desh.) ... | * | | * |
| " <i>diadema</i> , Desh. ... | | | * | * | " <i>multispirata</i> (Desh.) | | | * |
| " <i>denticulatum</i> , Lam. ... | | | * | * | " <i>tritorguata</i> (Desh.) | * | | * |
| " <i>Brocchii</i> , Desh. ... | | | * | * | " <i>pulcherrima</i> (Desh.) | * | | * |
| " <i>tuberculosum</i> , Lam. ... | | | * | * | " <i>salcifera</i> (Mellev.) | * | | * |
| " <i>nubitabile</i> , Lam. ... | | | * | * | " <i>textilis</i> (Desh.) ... | * | | * |
| " <i>Gravesi</i> , Desh. ... | | | * | * | " <i>praetonga</i> (Desh.) ... | * | | * |
| " <i>valdancurtense</i> , Coss ... | | | * | * | " <i>quadrifida</i> (Desh.) | * | | * |
| " <i>labidum</i> , Desh. ... | | | * | * | " <i>inaequilirata</i> (Desh.) | * | | * |
| " <i>Blainvilliei</i> , Desh. ... | | | * | * | " (<i>Cinctella</i>) <i>Archimedis</i> | * | | * |
| " <i>Picteti</i> , Desh. ... | | | * | * | (Desh.)... | | | * |
| " <i>tiara</i> , Lam. ... | | | * | * | " <i>trifaria</i> (Desh.) ... | * | | * |
| " <i>tiarella</i> , Desh. ... | | | * | * | " <i>trilirata</i> (Desh.) ... | * | | * |
| " <i>aquistriatum</i> , Desh. ... | | | * | * | " <i>mundula</i> (Desh.) ... | * | | * |
| " <i>mitreola</i> , Desh. ... | | * | * | * | " <i>variata</i> (Desh.) ... | * | | * |
| " <i>obliquatum</i> , Desh. ... | | | * | * | " <i>quadrirulcata</i> (Lam.) | * | | * |
| " <i>crenatulatum</i> , Desh. ... | | <i>a b</i> | <i>c</i> | <i>d</i> | " <i>quadrirugulata</i> (Desh.) | <i>a</i> | <i>c</i> | <i>d</i> |
| | <i>a</i> | <i>b</i> | <i>c</i> | <i>d</i> | | | | |

| | a | b | c | d |
|---|---|---|---|---|
| " <i>angustum</i> , Desh. | | | * | |
| " <i>subula</i> , Desh. ... | | | * | |
| " <i>stephanophorum</i> , Desh. | | * | * | |
| " <i>creniferum</i> , Desh. | * | | * | |
| " <i>pirenitiforme</i> , Desh. | | | * | |
| " <i>Jussieui</i> , Mayer | * | | * | |
| " <i>substriatum</i> , Lam. | | | * | |
| " <i>constrictum</i> , Desh. | | | * | |
| " <i>filiferum</i> , Desh. | | | * | |
| " <i>semicostatum</i> , Desh. | | | * | |
| " <i>obesum</i> , Desh. ... | * | | * | |
| " <i>Defrancei</i> , Desh. | * | | * | |
| " <i>helleoacense</i> , Desh. | * | | * | |
| " <i>globulosum</i> , Desh. | * | | * | |
| " <i>Guthelmi</i> , De Rainc. | | * | * | |
| " <i>triangulum</i> , Br. & Corn. | * | | * | |
| " <i>tenuistriatum</i> , Mellev. ... | | * | * | |
| " <i>polysarcum</i> , Coss. | | | * | |
| " <i>Passyi</i> , Desh. ... | | | * | |
| " <i>Feltii</i> , Desh. ... | | | * | |
| " <i>echinulatum</i> , Desh. | | | * | |
| " <i>lamellosum</i> , Brug. | | | * | |
| " <i>inabolutum</i> , Desh. | | | * | |
| " <i>Chrevallieri</i> , Coss. | | | * | |
| " <i>edulcoratum</i> , Coss. | | | * | |
| " <i>Peticlerci</i> , Coss. | | | * | |
| " <i>Goossensi</i> , Coss. | | | * | |
| " <i>fragile</i> , Desh. ... | | | * | |
| " <i>Hernesii</i> , Desh. | | | * | |
| " <i>crassicostatum</i> , Desh. ... | | | * | |
| " <i>costulatum</i> , Lam. | | | * | |
| " <i>semicristatum</i> , Baudon. | | | * | |
| " <i>limbatum</i> , Desh. | | | * | |
| " <i>inermis</i> , Desh. | | | * | |
| " <i>variculosum</i> , Desh. ... | | | * | |
| " <i>interruptum</i> , Desh. ... | | | * | |
| " <i>multispiratum</i> , Coss. | | | * | |
| " <i>Sandbergeria communis</i> , Desh. | | | * | |
| " <i>regularis</i> (Mellev.) ... | | | * | |
| " <i>turbinoipsis</i> , Desh. | | | * | |
| " <i>Pissaroi</i> , Coss. ... | | | * | |
| " <i>pseudoventricosa</i> , D'Orb. | | | * | |
| " <i>subobtusa</i> , D'Orb. | | | * | |
| " <i>(Aneurychius) secatis</i> , Desh. | | | * | |
| " <i>cyclostomoides</i> , Desh. | | | * | |
| " <i>valmondoisensis</i> , Coss. | | | * | |
| " <i>Teleostoma tuba</i> (Desh.) ... | | | * | |
| " <i>bacillum</i> (Lam.) ... | | | * | |
| " <i>Fastigiella rugosa</i> (Lam.) ... | | | * | |
| " <i>(Mellenillea) gibbosula</i> (Mellev.) ... | | | * | |
| " <i>Bilium semigranulosum</i> (Lam.) ... | | | * | |
| " <i>transenna</i> (Bayan) ... | | | * | |
| " <i>gibbosum</i> (Delr.) ... | | | * | |
| " <i>plicatum</i> (Desh.) ... | | | * | |
| " <i>acuminense</i> (Desh.) ... | | | * | |
| " <i>jucundum</i> (Desh.) ... | | | * | |
| " <i>Duchasteli</i> (Desh.) ... | | | * | |
| " <i>capillacum</i> (Desh.) ... | | | * | |
| " <i>catalaunense</i> (Desh.) ... | | | * | |
| " <i>intangibile</i> (Desh.) ... | | | * | |
| " <i>elachistum</i> , Coss. ... | | | * | |
| " <i>Cerithiopsis cancellata</i> (Lam.) ... | | | * | |
| " <i>ecostata</i> , Coss. ... | | | * | |
| " <i>quinguesulcata</i> (Desh.) ... | | | * | |
| " <i>(Trachyschenium) alveolata</i> (Desh.) ... | | | * | |
| " <i>chaussyensis</i> (Coss.) ... | | | * | |
| " <i>Maresi</i> (Desh.) ... | | | * | |
| " <i>trigeminata</i> (Desh.) ... | | | * | |
| " <i>Baudoni</i> (Desh.) ... | | | * | |
| " <i>diozodes</i> (Coss.) ... | | | * | |
| " <i>Bernayi</i> (Coss.) ... | | | * | |
| " <i>larva</i> (Lam.) ... | | | * | |
| " <i>dispar</i> (Desh.) ... | | | * | |
| " <i>(Cyrbasia) pupina</i> (Desh.) ... | | | * | |
| " <i>Triforis plicata</i> , Desh. | | | * | |
| " <i>(Trituba) bitubulata</i> , Baudon. ... | | | * | |
| " <i>fenestrata</i> , Coss. ... | | | * | |
| " <i>(Epetrium) minuta</i> , Desh. | | | * | |
| " <i>herouvalensis</i> , De Rainc. ... | | | * | |
| " <i>sinistrorsa</i> , Desh. ... | | * | * | |
| " <i>aspera</i> , Desh. ... | | * | * | |
| " <i>inversa</i> , Lam. ... | | * | * | |
| " <i>grignonensis</i> , Desh. | | | * | |
| " <i>ambigua</i> , Desh. ... | | * | * | |
| " <i>costulata</i> , Desh. ... | | | * | |
| " <i>(Ogriva) singularis</i> , Desh. | | | * | |
| " <i>inaequipartita</i> , Desh. | | | * | |
| " <i>conoidalis</i> , Rouault ... | | | * | |
| " <i>biplicata</i> , Rouault ... | | | * | |
| " <i>brevicula</i> , Coss. ... | | | * | |
| " <i>diozodes</i> , Coss. ... | | | * | |
| " <i>Colina perelegans</i> (Desh.) ... | | | * | |
| " <i>tenuis</i> (Desh.) ... | | | * | |

| | a | b | c | d |
|---|---|---|---|---|
| " <i>Deponthillieri</i> (Coss.) | | | | |
| " (<i>Tympanotomus cinctus</i> (Brug.)...) | | | | |
| " <i>semicoronatus</i> (L.am.) | | * | * | * |
| " <i>conoides</i> (Lam.) | | | * | * |
| " <i>emarginatus</i> (Lam.) | | | * | * |
| " <i>Cordieri</i> (Desh.) | | | * | * |
| " <i>submarginatus</i> (D'Orb.) | | | * | * |
| " <i>conarius</i> (Bayan) | | | * | * |
| " <i>Semperii</i> (Desh.) | | | * | * |
| " <i>prævatus</i> (Desh.) | | | * | * |
| " <i>papavus</i> (Desh.) | | | * | * |
| " <i>turris</i> (Desh.) | | | * | * |
| " <i>finatus</i> (Mant.) | | | * | * |
| " <i>circinatus</i> (Desh.) | | | * | * |
| " <i>Hericarti</i> (Desh.) | | | * | * |
| " <i>Roissyi</i> (Desh.) | | | * | * |
| " <i>involutus</i> (Lam.) | | | * | * |
| " <i>gradatus</i> (Desh.) | | | * | * |
| " <i>alternans</i> (Desh.) | | | * | * |
| " (<i>Pyrazus angulatus</i> (Sol.) | | | * | * |
| " <i>pyramidatus</i> (Desh.) | | | * | * |
| " <i>spectabilis</i> (Desh.) | | | * | * |
| " <i>Plateaui</i> , Coss. | | | * | * |
| " (<i>Exechestoma angulosus</i> (Lam.)...) | | | * | * |
| " <i>Bonnardi</i> (Desh.) | | | * | * |
| " <i>interruptus</i> (Lam.) | | | * | * |
| " <i>turritellatus</i> (Lam.) | | | * | * |
| " <i>scalaroides</i> (Desh.) | | | * | * |
| " (<i>Terebralia Bonellii</i> (Desh.)...) | | | * | * |
| " <i>curvicosatus</i> (Desh.) | | | * | * |
| " <i>Sowerbyi</i> (Desh.) | | | * | * |
| " <i>separatus</i> (Desh.) | | | * | * |
| " <i>Huarti</i> (De Rainc.) | | | * | * |
| " <i>nodularis</i> (Desh.) | | | * | * |
| " <i>inopinatus</i> (Desh.) | | | * | * |
| " <i>biserialis</i> (Desh.) | | | * | * |
| " <i>turbinoides</i> (Desh.) | | | * | * |
| " <i>goniophorus</i> (Desh.) | | | * | * |
| " <i>Falconeri</i> (Desh.) | | | * | * |
| " <i>Bianconii</i> (Desh.) | | | * | * |
| " <i>Fischeri</i> (Desh.) | | | * | * |
| " (<i>Arrhoges analoga</i> (Desh.) | | | * | * |
| " <i>Heberti</i> (Desh.) | | | * | * |
| " <i>Arrodactylus Plateaui</i> (Coss.) | | | * | * |
| " <i>Strombus</i> | | | * | * |
| " (<i>Strombidea ornatus</i> , Desh. | | | * | * |
| " <i>Boutillieri</i> (Bez.) | | | * | * |
| " <i>Rimella fissurella</i> (Linn.) | | | * | * |
| " <i>labrosa</i> (Sow.) | | | * | * |
| " <i>interrupia</i> (Desh.) | | | * | * |
| " <i>lucida</i> (Sow.) | | | * | * |
| " <i>mirabilis</i> (Desh.) | | | * | * |
| " (<i>Eclinochilus canalis</i> (Lam.)...) | | | * | * |
| " <i>Rostellaria plana</i> (Beyr.) | | | * | * |
| " (<i>Hippochrenes macroptera</i> , Lam....) | | | * | * |
| " <i>Murchisoni</i> , Desh. | | | * | * |
| " <i>columbaria</i> , Lam. | | | * | * |
| " <i>Baylei</i> , Desh. | | | * | * |
| " <i>Devalquei</i> , Desh. | | | * | * |
| " <i>Gisoritia tuberculosa</i> (Ducloz) | | | * | * |
| " <i>gisoritiensis</i> (Passy) ... | | | * | * |
| " <i>Chevallieri</i> , Coss. ... | | | * | * |
| " <i>Cypræa</i> (<i>Bernayia obesa</i> , Desh. | | | * | * |
| " <i>media</i> , Desh. ... | | | * | * |
| " <i>bartonensis</i> , Edw. ... | | | * | * |
| " <i>exerta</i> , Desh. ... | | | * | * |
| " (<i>Vulpicella angustoma</i> , Desh....) | | | * | * |
| " <i>prisca</i> , Desh. | | | * | * |
| " (<i>Luponia inflata</i> , Lam. ... | | | * | * |
| " <i>Doljusti</i> , De Laub. | | | * | * |
| " <i>Lautrieri</i> , Coss. | | | * | * |
| " <i>Levesquei</i> , Desh.... | | | * | * |
| " <i>Selleri</i> , De Rainc. | | | * | * |
| " <i>hiantua</i> , Coss. ... | | | * | * |
| " (<i>Cyprædia elegans</i> , Defr. | | | * | * |
| " <i>interposita</i> , Desh. | | | * | * |
| " <i>sulcosa</i> , Lam. ... | | | * | * |
| " <i>Sophieæ</i> , Bernay.... | | | * | * |
| " (<i>Trinia pedicularis</i> , Desh. | | | * | * |
| " <i>Bouryvi</i> , Coss. ... | | | * | * |
| " <i>Erato</i> | | | * | * |
| " (<i>Eratopsis crenata</i> (Desh.) | | | * | * |
| " <i>Wateleti</i> , Desh. | | | * | * |
| " <i>Bernayvi</i> , Coss. | | | * | * |
| " <i>Pinula tricarinata</i> , Lam. ... | | | * | * |
| " <i>pannus</i> (Desh.) ... | | | * | * |
| " <i>elegans</i> , Lam.... | | | * | * |
| " <i>fragilis</i> (Desh.) | | | * | * |
| " <i>tricostata</i> , Desh. | | | * | * |
| " <i>intermeati</i> , Mellev. ... | | | * | * |
| " <i>Cassid harpiformis</i> , Lam. | | | * | * |

| | a | b | c | d |
|---|---|---|---|---|
| " <i>gonitea</i> (Coss.) ... | | | * | |
| " <i>inornata</i> (Desh.) ... | | | * | |
| " <i>polygonoides</i> (Desh.) ... | | | * | |
| " <i>Eumortieri</i> (Baudon) ... | | | * | |
| " <i>multigranifer</i> (Desh.) ... | | | * | |
| " <i>scabrifuscula</i> (Desh.) ... | | | * | |
| " <i>reticulosa</i> (Desh.) ... | | | * | |
| " <i>nodularia</i> (Lam.) ... | | | * | |
| " <i>bicincta</i> (Desh.) ... | | | * | |
| " <i>planicos(ata)</i> (Desh.) ... | | | * | |
| " (<i>Sassia</i>) <i>Lejeunei</i> (Mellev.) ... | | | * | |
| " <i>Bernaui</i> (Coss.) ... | | | * | |
| " (<i>Ranularia</i>) <i>piraster</i> (Lam.) ... | | | * | |
| <i>Argobuccinum</i> <i>Boutillieri</i> , Coss. | | | | |
| <i>Murxx</i> | | | | |
| " (<i>Triplex</i>) <i>tripteroides</i> , Lam. | | | * | |
| " <i>fusoides</i> , Desh. '... | | | * | |
| " <i>micropterus</i> , Desh. | | | * | |
| " <i>contabulatus</i> , Lam. | | | * | |
| " <i>tricarinatus</i> , Lam. | | | * | |
| " <i>bispinosus</i> , Sow. ... | | | * | |
| " <i>denudatus</i> , Desh. | | | * | |
| " <i>asper</i> , Sol. | | | * | |
| " <i>bicos(atus)</i> , Desh. | | | * | |
| " (<i>Muricidea</i>) <i>distans</i> , Desh. | | | * | |
| " <i>Suerei</i> , Coss. | | | * | |
| " <i>Bernaui</i> , Desh. | | | * | |
| " <i>subrudis</i> , D'Orb. | | | * | |
| " <i>sarronensis</i> , Carez ... | | | * | |
| " <i>frondosus</i> , Lam. | | | * | |
| " <i>fraterculus</i> , Desh. | | | * | |
| " <i>foliaceus</i> , Desh. | | | * | |
| <i>Truncaria truncata</i> (Desh.) ... | | | * | |
| " <i>mirabilis</i> , Desh. ... | | | * | |
| " <i>insolita</i> , Desh. ... | | | * | |
| " <i>Pseudoliva obtusa</i> (Desh.) ... | | | * | |
| " <i>semicos(ata)</i> (Desh.) ... | | | * | |
| " <i> fissurata</i> (Desh.) ... | | | * | |
| " <i>prima</i> (Defr.) ... | | | * | |
| " <i>Cominella deserta</i> (Sol.) ... | | | * | |
| " <i>auverstenis</i> (Desh.) ... | | | * | |
| " <i>Desori</i> (Desh.) ... | | | * | |
| " <i>ovata</i> (Desh.) ... | | | * | |
| " <i>acies</i> (Wat.) ... | | | * | |
| " <i>lata</i> (Desh.) ... | | | * | |
| " <i>bicoloronata</i> (Mellev.) ... | | | * | |
| " <i>Tritonidea sub-Andrei</i> (D'Orb.) ... | | | * | |
| " <i>subambigua</i> (D'Orb.) ... | | | * | |
| " <i>decepta</i> (Defr.) ... | | | * | |
| " <i>excisa</i> (Lam.) ... | | | * | |
| " <i>axesta</i> (Bayan) ... | | | * | |
| " <i>interstrata</i> (Desh.) ... | | | * | |
| " <i>neglecta</i> (Desh.) ... | | | * | |
| " <i>costellifera</i> (Desh.) ... | | | * | |
| " <i>lata</i> (Sow.) ... | | | * | |
| " (<i>Endopachychilus</i>) <i>crassilabrum</i> (Desh.) ... | | | * | |
| " <i>semiplicata</i> (Desh.) ... | | | * | |
| " <i>sulcata</i> (Desh.) ... | | | * | |
| " <i>Rigaulti</i> (Desh.) ... | | | * | |
| " (<i>Cantharus</i>) <i>costulata</i> (Lam.) ... | | | * | |
| " <i>polygona</i> (Lam.) ... | | | * | |
| " <i>berrellensis</i> (De L. & C.) ... | | | * | |
| " <i>ravissulcata</i> (Desh.) ... | | | * | |
| " (<i>Tortisipho</i>) <i>jucundus</i> (Desh.) ... | | | * | |
| " <i>distortus</i> (Desh.) ... | | | * | |
| " <i>clathratulus</i> , Coss. | | | * | |
| " (<i>Volutopsis</i>) <i>Rotteri</i> (Baudon) ... | | | * | |
| " <i>Loustaux</i> , Coss. | | | * | |
| " <i>Siphonalia Marix</i> (Mellev.) ... | | | * | |
| " <i>planicos(ata)</i> (Mellev.) ... | | | * | |
| " <i>panniculata</i> (Desh.) ... | | | * | |
| " <i>chaussensis</i> , Coss. ... | | | * | |
| " <i>seminuda</i> (Desh.) ... | | | * | |
| " <i>variabilis</i> (Lam.) ... | | | * | |
| " <i>minuta</i> (Lam.) ... | | | * | |
| " <i>breviuscula</i> (Desh.) ... | | | * | |
| " <i>Ludovici</i> (De Raine.) ... | | | * | |
| " <i>lacrymosa</i> , Coss. ... | | | * | |
| " (<i>L</i>) <i>rofusus</i> <i>calvimontensis</i> (Coss.) ... | | | * | |
| " <i>scalarina</i> (Lam.) ... | | | * | |
| " <i>angusticos(ata)</i> (Mellev.) ... | | | * | |
| " (<i>Coptochetus</i>) <i>scalaroides</i> (Lam.) ... | | | * | |
| " <i>arenaria</i> , Coss. ... | | | * | |
| " <i>humilis</i> , Desh. ... | | | * | |
| " <i>costosa</i> (Desh.) ... | | | * | |
| " <i>truncata</i> (Baudon) ... | | | * | |
| " <i>speciosa</i> (Desh.) ... | | | * | |
| " <i>asperula</i> (Lam.) ... | | | * | |
| " <i>clathrata</i> (Lam.) ... | | | * | |
| " (<i>Penion</i>) <i>Bervillei</i> (Desh.) ... | | | * | |
| " (<i>Austrofuscus</i>) <i>plicatula</i> (Desh.) ... | | | * | |

| | a | b | c | d |
|---|---|---|---|---|
| <i>Latirus</i> | | | | |
| " (<i>Peristeria</i>) <i>fimiculosus</i> (Desh.)... | | | * | * |
| " <i>parisiensis</i> (Desh.)... | | | * | * |
| " <i>calvimonitensis</i> , Coss. | | | * | * |
| " <i>herouvalensis</i> (Desh.) | | | * | * |
| " <i>minor</i> (Desh.) | * | | * | * |
| " <i>Schlumbergeri</i> , Desh. | * | | * | * |
| " (<i>Leucozonia</i>) <i>Boutillieri</i> , Coss.... | | | * | * |
| " (<i>Latirus</i>) <i>subaffinis</i> (D'Orb.)... | | * | * | * |
| <i>Streptocheilus intortus</i> (Lam.) | | | * | * |
| " <i>approximatus</i> (Desh.) | | | * | * |
| " <i>segregatus</i> (Desh.)... | | * | * | * |
| " <i>crassicostatus</i> (Desh.) | | | * | * |
| " <i>squamulosus</i> (Desh.) | | | * | * |
| " <i>obliquatus</i> (Desh.)... | | * | * | * |
| " <i>incertus</i> (Desh.) | | | * | * |
| " <i>heptagonus</i> (Lam.)... | | | * | * |
| " (<i>Pseudolaticrus</i>) <i>Melleuillei</i> , Coss.... | * | | * | * |
| <i>Clavithites longareus</i> (Sol.) | | * | * | * |
| " <i>deformis</i> (Sol.) | | * | * | * |
| " <i>maximus</i> (Desh.) | | | * | * |
| " <i>macrospira</i> , Coss. | | | * | * |
| " <i>conjunctus</i> (Desh.) | | | * | * |
| " <i>tuberculatus</i> (Desh.) | | | * | * |
| " <i>Noë</i> (Chem.)... | | | * | * |
| " <i>dameriacensis</i> (Desh.) | | | * | * |
| " <i>rugosus</i> (Lam.) | | | * | * |
| " <i>angulatus</i> (Lam.) | | | * | * |
| " <i>livigatus</i> (Gm.) | | | * | * |
| " <i>monodon</i> , Lam. | | | | |
| " <i>olivula</i> , Baudon | | | | |
| " <i>Bernayi</i> , Coss. | | | | |
| " (<i>Cononitira</i>) <i>inaspecta</i> , Desh. | | | | |
| " <i>Vincenti</i> , Coss. | | | | |
| " <i>graniformis</i> , Lam. | | | | |
| " <i>marginata</i> , Lam. | | | | |
| " <i>fusellina</i> , Lam. | | | | |
| " <i>hordeola</i> , Desh. | | | | |
| " <i>prisca</i> , Desh. | | | | |
| " (<i>Fusinitira</i>) <i>aizyensis</i> , Desh. | * | | | |
| " <i>extranea</i> , Desh. | | | | |
| " <i>Barbieri</i> , Desh. | | | | |
| " <i>Gaudryi</i> , De Rainc. | | | | |
| " <i>Boutillieri</i> , Coss. | | | | |
| " <i>Bouryi</i> , Coss. | | | | |
| " <i>tetraphycta</i> , Coss. | | | | |
| " <i>cancelina</i> , Lam. | | | | |
| " <i>terchellum</i> , Lam. | | | | |
| " <i>Wateleti</i> , Br. & Corn. | * | | | |
| <i>Cryptochorda stromboïdes</i> (Herman)... | | | | |
| <i>Volula</i> | | | | |
| " (<i>Eopsephia</i>) <i>muricina</i> , Lam. | | | | |
| " <i>Frederici</i> , Bayan | | | | |
| " <i>Goldfussi</i> , Desh.... | | | | |
| " <i>Berthae</i> , De Rainc. | | | | |
| " <i>mixta</i> (Chem.) | | | | |
| " <i>torulosa</i> , Desh. | | | | |
| " <i>relicta</i> , Bayan | | | | |
| " <i>zonata</i> , Desh. | | | | |
| " <i>angusta</i> , Desh. | | | | |
| " (<i>Aurinia</i>) <i>Baudoni</i> , Desh. | * | | | |
| <i>Volubryia musicalis</i> (Lam.) | | | | |
| " <i>mitrata</i> (Desh.) | | | | |
| " <i>Wateleti</i> (Desh.) | | | | |
| " <i>quingueplicata</i> (Bayan) | | | | |
| " <i>Hoernesii</i> (Desh.) | | | | |
| " <i>Bouei</i> (Desh.) | | | | |
| " <i>Riga ii</i> (Desh.) | | | | |
| " <i>Lyria harpula</i> (Lam.) | | | | |
| " <i>coroni</i> , Morlet | | | | |
| " <i>Branderi</i> (Desh.) | | | | |
| " <i>turgidula</i> (Desh.) | | | | |
| " <i>magæ</i> (Edw.) | | | | |
| " <i>Marginella eburnea</i> , Lam. | | | | |
| " <i>crassula</i> , Desh. | | | | |
| " <i>Chastangi</i> , Coss. | | | | |
| " <i>Ettwardsi</i> , Desh. | | | | |
| " <i>dissimilis</i> , Desh. | | | | |
| " <i>cylindracea</i> , Desh. | | | | |
| " <i>denifera</i> , Lam. | | | | |
| " <i>hordeola</i> , Desh. | | | | |
| " <i>crenulata</i> , Desh. | | | | |
| " <i>acutangula</i> , Desh. | | | | |
| " <i>contabulata</i> , Desh. | | | | |
| " <i>bifidoplicata</i> , Charlesw. | | | | |
| " <i>a-normis</i> , Morlet | | | | |
| " <i>fragilis</i> , Desh.... | | | | |
| " <i>Bouryi</i> , Coss.... | | | | |
| " (<i>Egouena</i>) <i>nitidula</i> , Desh. | | | | |
| " <i>entomella</i> , Coss. | | | | |
| " (<i>Cryptospira</i>) <i>ovulata</i> , Lam. | | | | |
| " <i>elevata</i> , Coss. | | | | |
| " <i>Frederici</i> , Coss. | | | | |
| " <i>pusilla</i> , Edw. | | | | |

| | a | b | c | d |
|--|---|---|---|---|
| " (<i>Ancillarina</i>) <i>canalyfera</i> , Lam.... | | | | |
| <i>Cancellaria</i> | | | | |
| " (<i>Uxia</i>) <i>costulata</i> , Lam. ... | * | | | |
| " <i>rhadoia</i> , Bayan ... | * | | | |
| " <i>diadema</i> , Wat. ... | * | | | |
| " <i>delecta</i> , Desh. ... | * | | | |
| " <i>separata</i> , Desh. ... | * | | | |
| " <i>multiensis</i> , Morlet ... | * | | | |
| " <i>crenulata</i> , Desh. ... | * | | | |
| " <i>dentifera</i> , Desh. ... | * | | | |
| " <i>Boutillieri</i> , Coss. ... | * | | | |
| " <i>Cossmanni</i> , Morlet... .. | * | | | |
| " <i>infraoccinea</i> , Coss. ... | * | | | |
| " <i>angusta</i> , Wat. ... | * | | | |
| " <i>interrupta</i> , Desh. ... | * | | | |
| " <i>speciosa</i> , Desh. ... | * | | | |
| " <i>ornata</i> , Desh. ... | * | | | |
| " <i>fusiformis</i> , Desh. ... | * | | | |
| " <i>spectabilis</i> , Desh. ... | * | | | |
| " <i>suturalis</i> , Sow. ... | * | | | |
| " <i>Danieli</i> , Morlet ... | * | | | |
| " (<i>Sveltella</i>) <i>quantula</i> , Desh ... | * | | | |
| " <i>Bezantoni</i> , De Ranc. ... | * | | | |
| " <i>semicathrata</i> , Morlet ... | * | | | |
| " <i>nana</i> , Desh. ... | * | | | |
| " (<i>Admetula</i>) <i>evulsa</i> , Sol. ... | * | | | |
| " <i>dubia</i> , Desh. ... | * | | | |
| " <i>levuscula</i> , Sow. ... | * | | | |
| " <i>striatolata</i> , Desh. ... | * | | | |
| " <i>sinuosa</i> , Coss. ... | * | | | |
| " <i>Bernuyi</i> , Coss. ... | * | | | |
| " <i>sphaerica</i> , Coss. ... | * | | | |
| " <i>derelictus</i> , Desh. ... | | | | |
| " <i>turriculatus</i> , Desh. | | | | |
| " <i>incomptus</i> , Desh. | | | | |
| <i>Conorbis marginatus</i> (Lam.)... .. | | | | |
| " <i>subangulatus</i> (Desh.)... .. | | | | |
| " <i>aequiparitus</i> , Coss. ... | | | | |
| <i>Cryptoconus flosus</i> (Lam.) ... | | | | |
| " <i>Baudoni</i> , Coss. ... | | | | |
| " <i>calophorus</i> (Desh.) ... | | | | |
| " <i>subdepressatus</i> (Desh.)... .. | | | | |
| " <i>clavicularis</i> (Lam.) ... | | | | |
| " <i>priscus</i> (Sol.)... .. | | | | |
| " <i>subllevigatus</i> (D'Orb.) ... | | | | |
| " <i>approximatus</i> (Desh.) ... | | | | |
| " <i>denudatus</i> (Desh.) ... | | | | |
| " <i>lineolatus</i> (Desh.) ... | | | | |
| " <i>unifascialis</i> (Desh.) ... | | | | |
| " <i>erectus</i> (Desh.) ... | | | | |
| " <i>interpositus</i> (Desh.) ... | | | | |
| " <i>inacquistriatus</i> (Desh.) ... | | | | |
| " <i>bisstriatus</i> (Desh.) ... | | | | |
| " <i>glabratus</i> (Lam.) ... | | | | |
| " <i>labiatus</i> (Desh.) ... | | | | |
| " <i>elongatus</i> (Desh.) ... | | | | |
| " <i>infragradatus</i> , Coss. | | | | |
| <i>Pseudotoma Lousiaur</i> (Desh.) ... | | | | |
| " <i>coronata</i> (Lam.)... .. | | | | |
| " <i>quieta</i> (Desh.) ... | | | | |
| " <i>colophora</i> , Coss. | | | | |
| <i>Borsonia</i> | | | | |
| " (<i>Phlyctis</i>) <i>calvimontensis</i> , Desh.... | | | | |
| <i>Trachelochetus desmuis</i> (Edw.) | | | | |
| <i>Asthenotoma funiculosa</i> (Desh.) | | | | |
| " <i>Cossmanni</i> (De Ranc.)... .. | | | | |
| " <i>zonulata</i> (Edw.)... .. | | | | |
| " <i>microchilus</i> (Edw.) ... | | | | |
| " <i>dissimilis</i> (Edw.) ... | | | | |
| " <i>quadririncta</i> (Coss.) ... | | | | |
| <i>Pleurotoma</i> | | | | |
| " (<i>Surcula</i>) <i>transversaria</i> , Lam.... | | | | |
| " <i>antiqua</i> , Desh. ... | | | | |
| " <i>subelegans</i> , D'Orb. ... | | | | |
| " <i>exornata</i> , Desh. ... | | | | |
| " <i>Vaudini</i> , Desh. ... | | | | |
| " <i>terebraalis</i> , Lam. ... | | | | |
| " <i>Chapuisi</i> , Desh. ... | | | | |
| " <i>catenata</i> , Lam. ... | | | | |
| " <i>Plateaui</i> , Coss. ... | | | | |
| " <i>dentata</i> , Lam. ... | | | | |
| " <i>Michelini</i> , Desh. ... | | | | |
| " <i>textiliosa</i> , Desh. ... | | | | |
| " <i>polycesta</i> , Bayan ... | | | | |
| " <i>polygona</i> , Desh. ... | | | | |
| " <i>decipiens</i> , Desh. ... | | | | |
| " <i>multigyrata</i> , Desh. ... | | | | |
| " <i>striatophora</i> , Bayan ... | | | | |
| " (<i>Apiotoma</i>) <i>pirulata</i> , Desh. ... | | | | |
| " (<i>Hemipleurotoma</i>) <i>Lau-</i> | | | | |
| <i>brereri</i> , Coss. ... | | | | |
| " <i>Wateleti</i> , Desh. ... | | | | |
| " <i>metableta</i> , Coss. ... | | | | |
| " <i>Prestwichi</i> , F.dw. ... | | | | |

| 53. GASTROPODA. | | L.L.E. | L.E. | M.E. | U.E. | 54. GASTROPODA. | | L.L.E. | L.E. | M.E. | U.E. |
|---|---|--------|------|------|--|---|--|--------|------|------|------|
| [<i>Pleurotoma</i> " <i>(Hemipleurotoma) infraö-</i> " <i>carnica</i> , Coss. | * | | | | | [<i>Raphitoma</i> " <i>pachycolpus</i> , Coss. | | | | | |
| " " <i>Melvillei</i> , Coss. | * | | | | " " <i>quantula</i> (Desh.) | " " <i>subattenuata</i> (D'Orb.) | | | | | |
| " " <i>cancellata</i> , Desh. | * | | | | " " <i>striolaris</i> (Desh.) | " " <i>daneriensis</i> (Desh.) | | | | | |
| " " <i>uniserialis</i> , Desh. | * | | | | " " <i>Baudoni</i> (Desh.) | " " <i>citharella</i> (Desh.) | | | | | |
| " " <i>plebeia</i> , Sow. | * | | | | " " <i>Capellini</i> (Desh.) | " " <i>Boutillieri</i> , Coss. | | | | | |
| " " <i>(Eopleurotoma) multico-</i> " <i>lata</i> , Desh. | * | | | | " " <i>perplexa</i> (Desh.) | " " <i>leptocolpus</i> , Coss. | | | | | |
| " " <i>Lajonkairi</i> , Desh. | * | | | | " " <i>dictyella</i> , Coss. | " " <i>columnella</i> (Desh.) | | | | | |
| " " <i>expedita</i> , Desh. | * | | | | " " <i>Plateani</i> , Coss. | " " <i>(Systenope) polycolpus</i> , Coss. | | | | | |
| " " <i>distans</i> , Desh. | * | | | | " " <i>goniocolpus</i> , Coss. | " " <i>guipiltensis</i> , Coss. | | | | | |
| " " <i>striatularis</i> , Desh. | * | | | | " " <i>striatularis</i> , Coss. | " " <i>linophora</i> , Coss. | | | | | |
| " " <i>spretta</i> , Desh. | * | | | | " " <i>Ambhyacrum rugosum</i> (Desh.) | " " <i>Bernuyi</i> , Coss. | | | | | |
| " " <i>oligocolpus</i> , Coss. | * | | | | " " <i>crenuligerum</i> , Coss. | " " <i>Chevallieri</i> , Coss. | | | | | |
| " " <i>curvicosta</i> , Lam. | * | | | | " " <i>Thesbia microtoma</i> , Coss. | " " <i>Peratotoma nana</i> (Desh.) | | | | | |
| " " <i>bicata</i> , Lam. | * | | | | " " <i>fragilis</i> (Desh.) | " " <i>striaralla</i> (Lam.) | | | | | |
| " " <i>radiuscula</i> , Desh. | * | | | | " " <i>dimeres</i> (Coss.) | | | | | | |
| " " <i>undata</i> , Lam. | * | | | | | | | | | | |
| " " <i>fluctuosa</i> , Desh. | * | | | | | | | | | | |
| " " <i>plicaria</i> , Desh. | * | | | | | | | | | | |
| " " <i>pinguina</i> , Desh. | * | | | | | | | | | | |
| " " <i>Larteti</i> , Desh. | * | | | | | | | | | | |
| " " <i>tenuiserialata</i> , Desh. | * | | | | | | | | | | |
| " " <i>(Oxyacrum) oblitterata</i> , Desh. | * | | | | | | | | | | |
| " " <i>inflexa</i> , Lam. | * | | | | | | | | | | |

[*Volvaria*
"*(Volvariella) Lanarcki*
(Desh.) ...
"*Diemali*, De Rainc. ...
Liocarenus conovuliformis
(Desh.) ...
Douvillia arcuaria (Mellev.) ...
Tornatina gignensis (Desh.) ...
Yobulella rostrata (Coss.) ...
"*oxyacrum* (Coss.) ...
"*radius* (Desh.) ...
"*redacta* (Desh.) ...
Scaphander parvianensis, D'Orb.
"*Brongniarti*, Desh. ...
"*conicus*, Desh. ...
"*Caurveti* (De Rainc.) ...
"*levvis* (Defr.) ...
"*distans*, Desh. ...
"*(Diaphana) assulus*, Desh.
"*pulchellus*, Desh. ...
Philine excavata (Desh.) ...
striata (Desh.) ...
Vaudini (Desh.) ...
expansa (Sow.) ...
corrugata, Coss. ...
Bullinella Bruguierei (Desh.) ...
Verneuili (Desh.) ...
Lebruni (Desh.) ...

| | a | b | c | d |
|--|---|---|---|---|
| " <i>constricta</i> , Edw. ... | | | * | * |
| " <i>lepta</i> , Edw. ... | | | * | * |
| " <i>contabulata</i> , Desh. ... | | | * | * |
| <i>Drillia</i> Bourry, Coss. ... | | | * | * |
| " <i>brevicauda</i> (Desh.) ... | | | * | * |
| " <i>essonensis</i> (De Laub.) ... | | | * | * |
| " <i>nodulosa</i> (Lam.) ... | | | * | * |
| " <i>obliquata</i> (Desh.) ... | | | * | * |
| " <i>granifera</i> (Desh.) ... | | | * | * |
| " <i>decussata</i> (Lam.) ... | | | * | * |
| " <i>brevicula</i> (Desh.) ... | | | * | * |
| " <i>calvimontensis</i> , Coss. ... | | | * | * |
| " <i>furcata</i> (Lam.) ... | | | * | * |
| " <i>ravicostulata</i> (Desh.) ... | | | * | * |
| " (<i>Crassispira</i>) <i>angulosa</i> (Desh.) ... | | | * | * |
| " <i>pantrachia</i> , Coss. ... | | | * | * |
| " <i>turrella</i> (Desh.) ... | | | * | * |
| " <i>filifera</i> (Mellev.) ... | | | * | * |
| " <i>granulata</i> (Lam.) ... | | | * | * |
| " <i>subgranulosa</i> (D'Orb.) ... | | | * | * |
| " <i>margaritula</i> (Desh.) ... | | | * | * |
| " <i>mesomorpha</i> , Coss. ... | | | * | * |
| " <i>Maussoneti</i> , Coss. ... | | | * | * |
| " <i>oxyarum</i> , Coss. ... | | | * | * |
| " <i>hypermece</i> , Coss. ... | | | * | * |
| " <i>sulcata</i> (Lam.) ... | | | * | * |
| " <i>Danjouxi</i> (Baudon) ... | | | * | * |
| " <i>costaria</i> (Desh.) ... | | | * | * |
| " <i>simplex</i> (Desh.) ... | | | * | * |
| " <i>ecaudata</i> (Desh.) ... | | | * | * |
| " <i>Raphitoma plicata</i> (Lam.) ... | | | * | * |
| " <i>costellata</i> (Lam.) ... | | | * | * |
| <i>Mangilia</i> <i>parisiensis</i> , Coss. ... | | | * | * |
| " <i>labratula</i> , Coss. ... | | | * | * |
| " <i>acceptata</i> , Desh. ... | | | * | * |
| " <i>semicostulata</i> (Desh.) ... | | | * | * |
| " <i>Terebra plicatula</i> , Lam. ... | | | * | * |
| <i>Eoatlantia spiruloides</i> (Lam.) ... | | | * | * |
| <i>Actæon subinflatus</i> , D'Orb. ... | | | * | * |
| " <i>Gardneri</i> , Coss. ... | | | * | * |
| " <i>turgidus</i> (Desh.) ... | | | * | * |
| " <i>Gilherii</i> , Coss. ... | | | * | * |
| " <i>Deshayesi</i> (De R. & M.C.) ... | | | * | * |
| " <i>Monhiersi</i> (Carez) ... | | | * | * |
| " <i>electus</i> (Desh.) ... | | | * | * |
| " <i>striatulus</i> (Desh.) ... | | | * | * |
| " <i>alter</i> (Desh.) ... | | | * | * |
| " <i>latus</i> (Desh.) ... | | | * | * |
| " <i>Gmelini</i> , Bayan ... | | | * | * |
| " <i>procerus</i> (Desh.) ... | | | * | * |
| " <i>Loustaui</i> (Desh.) ... | | | * | * |
| " <i>Chevallieri</i> (Desh.) ... | | | * | * |
| " (<i>Actæonidea</i>) <i>dactylinus</i> (Desh.) ... | | | * | * |
| " <i>Minieri</i> (Desh.) ... | | | * | * |
| " (<i>Crenilabium</i>) <i>acutalatus</i> , Coss. ... | | | * | * |
| " (<i>Solidula</i>) <i>Bœaleti</i> (Baudon) ... | | | * | * |
| " (<i>Tornatellera</i>) <i>parisiensis</i> (Desh.) ... | | | * | * |
| " (<i>Semiactæon</i>) <i>sphericulus</i> (Desh.) ... | | | * | * |
| " <i>Vô varia tulloides</i> , Lam. ... | | | * | * |
| " <i>acutuscula</i> , Sow. ... | | | * | * |
| " <i>goniophora</i> (Desh.) ... | | | * | * |
| " <i>angustoma</i> (Desh.) ... | | | * | * |
| " (<i>Acrotrema</i>) <i>cylindroides</i> (Desh.) ... | | | * | * |
| " <i>ambigena</i> (Desh.) ... | | | * | * |
| " <i>elliptica</i> (Sow.) ... | | | * | * |
| " <i>consors</i> (Desh.) ... | | | * | * |
| " <i>striatissima</i> (Desh.) ... | | | * | * |
| " <i>sectifera</i> (Coss.) ... | | | * | * |
| " <i>denuclata</i> (Desh.) ... | | | * | * |
| " <i>convulus</i> (Desh.) ... | | | * | * |
| " <i>Caillati</i> (Desh.) ... | | | * | * |
| " (<i>Acrostemma</i>) <i>coronata</i> (Lam.) ... | | | * | * |
| " <i>Bezanconi</i> (Morlet) ... | | | * | * |
| " <i>elacate</i> (Bayan) ... | | | * | * |
| " <i>Atyis ovulata</i> (Lam.) ... | | | * | * |
| " <i>lumbulicata</i> (Desh.) ... | | | * | * |
| " <i>sulcatina</i> (Desh.) ... | | | * | * |
| " <i>cincta</i> (Desh.) ... | | | * | * |
| " <i>glaphyria</i> (Desh.) ... | | | * | * |
| " <i>Lamarcki</i> (Desh.) ... | | | * | * |
| " <i>semistriata</i> (Desh.) ... | | | * | * |
| " <i>Bulla plicata</i> , Desh. ... | | | * | * |
| " <i>globulus</i> , Desh. ... | | | * | * |
| " <i>Acera striatella</i> (Lam.) ... | | | * | * |
| " <i>Kingicula ringens</i> (Lam.) ... | | | * | * |
| " <i>Langlassei</i> , Morlet ... | | | * | * |
| " <i>minor</i> , Desh. ... | | | * | * |
| " <i>Bezanconi</i> , Morlet ... | | | * | * |
| " <i>Dugasti</i> , Morlet ... | | | * | * |
| " <i>Cossmanni</i> , Morlet ... | | | * | * |
| " <i>Raincourti</i> , Morlet ... | | | * | * |

| | a | b | c | d | a | b | c | d | a | b | c | d |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| " <i>arenularia</i> , <i>Brard</i> ... | * | | | | " (<i>Micrelasma</i>) <i>Lemoinei</i> , | | | | " (<i>Micrelasma</i>) <i>Lemoinei</i> , | | | |
| " <i>ligularum</i> , <i>Desh.</i> ... | | | * | * | <i>Coss.</i> ... | | | | <i>Coss.</i> ... | | | |
| " <i>elata</i> , <i>Desh.</i> ... | | | * | * | <i>Leuconia remiensi</i> (<i>Boissy</i>)... | | | | <i>Leuconia remiensi</i> (<i>Boissy</i>)... | | | |
| " <i>Bervillei</i> , <i>Desh.</i> ... | | | * | * | " (<i>?</i>) <i>pubeis</i> (<i>De L. & C.</i>)... | | | | " (<i>?</i>) <i>pubeis</i> (<i>De L. & C.</i>)... | | | |
| " <i>Michelini</i> , <i>Desh.</i> ... | | | * | * | <i>Alexia Boissyi</i> , <i>Coss.</i> | | | | <i>Alexia Boissyi</i> , <i>Coss.</i> | | | |
| " <i>inconspicua</i> , <i>Desh.</i> ... | | | | | <i>Marinula Marceauxi</i> (<i>Desh.</i>) | | | | <i>Marinula Marceauxi</i> (<i>Desh.</i>) | | | |
| " <i>convexa</i> , <i>Edw.</i> ... | | | | | " <i>Pfeifferi</i> (<i>Desh.</i>) | | | | " <i>Pfeifferi</i> (<i>Desh.</i>) | | | |
| " <i>ovum</i> , <i>Brong.</i> ... | | | | | " <i>Lowei</i> (<i>Desh.</i>) | | | | " <i>Lowei</i> (<i>Desh.</i>) | | | |
| " (<i>Bulimnaea</i>) <i>crassula</i> , <i>Desh.</i> | | | | | " <i>Lapparenti</i> (<i>De Rainc.</i>) | | | | " <i>Lapparenti</i> (<i>De Rainc.</i>) | | | |
| " <i>Duchasteli</i> , <i>Desh.</i> ... | | | | | <i>Gilbertia inopinata</i> , <i>Morlet</i> ... | | | | <i>Gilbertia inopinata</i> , <i>Morlet</i> ... | | | |
| " <i>brachystoma</i> , <i>Coss.</i> ... | * | | | | <i>Solidoma crassidens</i> , <i>Desh.</i> ... | | | | <i>Solidoma crassidens</i> , <i>Desh.</i> ... | | | |
| <i>Planorbis</i> | | | | | " <i>prælonga</i> , <i>Desh.</i> ... | | | | " <i>prælonga</i> , <i>Desh.</i> ... | | | |
| " (<i>Menetus</i>) <i>goniobasis</i> , <i>Sand.</i> | | | | * | " <i>singularis</i> , <i>Desh.</i> ... | | | | " <i>singularis</i> , <i>Desh.</i> ... | | | |
| " <i>pseudammonius</i> | | | | * | <i>Tournoueri</i> , <i>De</i> | | | | <i>Tournoueri</i> , <i>De</i> | | | |
| " (<i>Schl.</i>)... | | | | * | <i>Rainc.</i> | | | | <i>Rainc.</i> | | | |
| " <i>paciacensis</i> , <i>Desh.</i> ... | | | | * | " <i>biplicata</i> (<i>Desh.</i>) | | | | " <i>biplicata</i> (<i>Desh.</i>) | | | |
| " <i>rillyensis</i> , <i>Bayan</i> ... | | | | * | <i>Glandina Naudoti</i> (<i>Michelin</i>) | | | | <i>Glandina Naudoti</i> (<i>Michelin</i>) | | | |
| " <i>levigatus</i> , <i>Desh.</i> ... | | | | * | " <i>longipontensis</i> , <i>Bayan</i> | | | | " <i>longipontensis</i> , <i>Bayan</i> | | | |
| " <i>sparnacensis</i> , <i>Desh.</i> ... | | | | * | <i>Coridieri</i> (<i>Desh.</i>) | | | | <i>Coridieri</i> (<i>Desh.</i>) | | | |
| " <i>spiruloides</i> , <i>Desh.</i> ... | | | | * | <i>Tournoueri</i> , <i>Denainv.</i> | | | | <i>Tournoueri</i> , <i>Denainv.</i> | | | |
| " <i>pygmaeus</i> , <i>Desh.</i> ... | | | | * | <i>Deschiensis</i> , <i>Bayan</i> ... | | | | <i>Deschiensis</i> , <i>Bayan</i> ... | | | |
| " (<i>Helisoma</i>) <i>enopthalus</i> , <i>Sow.</i> | | | | * | " <i>Terrieri</i> (<i>Boissy</i>) | | | | " <i>Terrieri</i> (<i>Boissy</i>) | | | |
| " <i>subovatus</i> , <i>Desh.</i> ... | | | | * | " <i>fragilis</i> (<i>Desh.</i>) | | | | " <i>fragilis</i> (<i>Desh.</i>) | | | |
| " <i>altrovbrs</i> , <i>Coss.</i> | | | | * | <i>Vitrina rillyensis</i> , <i>Boissy</i> | | | | <i>Vitrina rillyensis</i> , <i>Boissy</i> | | | |
| " <i>catinus</i> , <i>Desh.</i> | | | | * | <i>Zonites Pellati</i> (<i>Desh.</i>) | | | | <i>Zonites Pellati</i> (<i>Desh.</i>) | | | |
| " (<i>Auisus</i>) <i>subangulatus</i> , <i>Lam.</i> | | | | * | <i>Arriophanta</i> | | | | <i>Arriophanta</i> | | | |
| " <i>nitidulus</i> , <i>Lam.</i> ... | | | | * | " (<i>Rhysola</i>) <i>occlusa</i> (<i>Edw.</i>) | | | | " (<i>Rhysola</i>) <i>occlusa</i> (<i>Edw.</i>) | | | |
| " <i>Baudoni</i> , <i>Desh.</i> ... | | | | * | <i>Helix Drouiti</i> , <i>Boissy</i> | | | | <i>Helix Drouiti</i> , <i>Boissy</i> | | | |
| " <i>cuisensis</i> , <i>Coss.</i> | | | | * | <i>Heberti</i> , <i>Desh.</i> | | | | <i>Heberti</i> , <i>Desh.</i> | | | |
| " <i>goniophorus</i> , <i>Morlet</i> | | | | * | <i>Edwardsi</i> , <i>Desh.</i> | | | | <i>Edwardsi</i> , <i>Desh.</i> | | | |
| " <i>hemistoma</i> , <i>Sow.</i> ... | | | | * | " (<i>Sagdellina</i>) <i>Chevalieri</i> , | | | | " (<i>Sagdellina</i>) <i>Chevalieri</i> , | | | |
| " <i>herouvalensis</i> , <i>Coss.</i> | | | | * | <i>Coss.</i> ... | | | | <i>Coss.</i> ... | | | |
| " <i>tropis</i> , <i>Edw.</i> | | | | * | " <i>Laubrierei</i> , <i>Coss.</i> ... | | | | " <i>Laubrierei</i> , <i>Coss.</i> ... | | | |

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| <i>Nuculana gracilis</i> , Desh. ... | | | | | | * | |
| <i>Limopsis jeurensis</i> , Desh. ... | | | | | | * | |
| <i>Axincea angusticostata</i> , Lam. ... | | * | | | | * | |
| " <i>obliterata</i> , Desh. ... | | * | | | | * | |
| " <i>obovata</i> , Lam. ... | | * | | | | * | |
| <i>Arca Sandbergeri</i> , Desh. ... | | * | | | | * | |
| " (<i>Barbatia</i>) <i>pretiosa</i> , Desh. ... | | * | | | | * | |
| <i>Mytilus denticulatus</i> , Lam. ... | | * | | | | * | |
| <i>Modiola stampinensis</i> , Coss. and Lamb. ... | | * | | | | * | |
| " <i>Lemeslei</i> , Coss. & Lamb. ... | | * | | | | * | |
| " <i>delicatula</i> , Desh. ... | | * | | | | * | |
| <i>Lithodomus analogus</i> , Desh. ... | | * | | | | * | |
| <i>Modiolaria Brauni</i> , Coss. and Lamb. ... | | * | | | | * | |
| <i>Crenella Depoutailheri</i> , Coss. and Lamb. ... | * | | | | | | |
| <i>Pinna Deshayesi</i> , Mayer ... | | | * | | | | |
| <i>Avicula stampinensis</i> , Desh. ... | | | * | | | | |
| <i>Perna Heberti</i> , Coss. and Lamb. ... | | | * | | | | |
| <i>Lima Sandbergeri</i> , Desh. ... | | * | | | | | |
| " <i>Klipsteri</i> , Coss. and Lamb. ... | | * | | | | | |
| <i>Chlamys decussata</i> , Münster ... | | * | | | | | |
| " <i>inaequalis</i> , Braun ... | | * | | | | | |
| " <i>picta</i> , Goldf. ... | | * | | | | | |
| <i>Spondylus tenuispina</i> , Sandb. ... | | * | | | | | |
| <i>Ostrea callifera</i> , Lam. ... | | * | | | | | |
| " <i>longirostris</i> , Lam. ... | | * | | | | | |
| " <i>cyathula</i> , Lam. ... | | * | | | | | |
| <i>Neritopsis Lorioli</i> , Coss. and Lamb. ... | | | | | | | * |
| <i>Nerita decorticata</i> , Coss. and Lamb. ... | | | | | | | * |
| <i>Neritina Duchasteli</i> , Desh. ... | | * | | | | | |
| " <i>propinqua</i> , Coss. and Lamb. ... | | * | | | | | |
| <i>Eulimella Bezanconi</i> , Coss. and Lamb. ... | | * | | | | | |
| <i>Odontostomia curta</i> , Desh. ... | | * | | | | | * |
| " <i>obesula</i> , Desh. ... | | * | | | | | * |
| " <i>militaris</i> , Desh. ... | | * | | | | | * |
| " <i>acuminata</i> , Desh. ... | | * | | | | | * |
| " <i>plicatula</i> , Desh. ... | | * | | | | | * |
| <i>Turbonilla Heberti</i> , Desh. ... | | * | | | | | * |
| " <i>Arnauti</i> , Coss. and Lamb. ... | | * | | | | | * |
| " <i>subulata</i> , Mérian ... | | * | | | | | * |
| " <i>Aonis</i> , D'Orb. ... | | * | | | | | * |
| " <i>ambigua</i> , Desh. ... | | * | | | | | * |
| " <i>imbricataria</i> , Desh. ... | | * | | | | | * |
| " <i>scalatroides</i> , Desh. ... | | * | | | | | * |
| <i>Eulima acicula</i> , Sandb. ... | | * | | | | | * |
| " <i>Lamberiti</i> , Coss. ... | | * | | | | | * |
| " <i>Naumannii</i> , Von Krenen ... | | * | | | | | * |
| <i>Scala Sandbergeri</i> , Desh. ... | | * | | | | | * |
| " <i>Bezanconi</i> , De Boury ... | | * | | | | | * |
| <i>Natica Nysti</i> ... | * | | | | | | |
| " <i>achatisis</i> , Recluz ... | | * | | | | | * |
| " <i>Combesi</i> , Bayan ... | | * | | | | | * |
| " <i>stampinensis</i> , Coss. and Lamb. ... | | * | | | | | * |
| <i>Ampullina crassatina</i> , Desh. ... | | * | | | | | * |
| <i>Deshayesia parisiensis</i> , Raulin ... | | * | | | | | * |

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| <i>Capulus Goossensi</i> , Coss. and Lamb. ... | | " <i>Sandbergeri</i> , Desh. ... | | | | | | * | | |
| <i>Calyptrea striatella</i> , Nyst ... | | " <i>submargaritaceum</i> , Braun. | | | | | * | | | |
| " <i>labellata</i> , Desh. ... | | " <i>Bourdoti</i> , Coss. & Lamb. | F. { C. de Be.; | | | | * | | | |
| <i>Pomatias antiquum</i> , Brongn. ... | | " <i>Davidi</i> , Coss. and Lamb. | } M. Sup. | | | | | | | |
| " <i>claudesinum</i> , Desh. | | " <i>Diasoma Gratelopi</i> , D'Orb. | C. de Be. | | | | | | | |
| " <i>Bithinia hellicella</i> , Braun. ... | | " <i>Sandbergeria abscondita</i> , Desh. | | * | | | | | | V.F.M. |
| " " <i>Dubuissoni</i> , Bouill. ... | | " <i>Bittium sublimina</i> , D'Orb. ... | | * | | | | | | |
| " " <i>Sandbergeri</i> , D'sh. ... | | " <i>Cerithiella trilineata</i> , Phil. ... | | | | | | | | |
| " " <i>pygmaea</i> , Desh. ... | | " <i>Triforis tricarminatus</i> , Stan. Meun. ... | | | | | | | | |
| " " <i>stampinensis</i> , Coss. and Lamb. ... | | " <i>Potamides Lamarcki</i> , Brong. ... | M.E. | | | | | | | |
| " " <i>Duchasteli</i> , Nyst ... | * | " <i>subinctus</i> , D'Orb. ... | | | | | | | | |
| " <i>jeurensis</i> , Bezancon | | " (<i>Tympanotomus trochlearis</i> , Lam. ... | | | | | | | | |
| " <i>Stenothyra pupa</i> , Nyst ... | | " " <i>contabulatus</i> , Desh. | E. | | | | | | | F. |
| " <i>perminuta</i> , Desh. ... | | " " <i>diaboli</i> , Brong. ... | | | | | | | | F. |
| " <i>Rissoia turbinata</i> , Def. ... | | " " <i>insolitus</i> , Desh. ... | | | | | | | | |
| " " <i>dubia</i> , Def. ... | | " (<i>Terebralia intradentatus</i> , Desh. ... | N.P.F.M. | | | | | | | |
| " " <i>inchinata</i> , Desh. ... | | " (<i>Granulolabium plicatus</i> , Brug. ... | F. F.M.V. | | | | | | | V.M. |
| " " <i>biangulata</i> , Desh. ... | | " <i>Aporrhais speciosa</i> , Schlot. ... | | | | | | | | V.F.M.N. |
| " <i>Rissoina cochlearina</i> , Stan. Meun. ... | | " <i>Cypraea subexcisa</i> , Braun. ... | | | | | | | | F. |
| " <i>Lacuna labiata</i> , Sandb. ... | | " <i>Morio Buchi</i> , Boll. ... | | | | | | | | |
| " " <i>eburniformis</i> , Sandb. ... | | " <i>Lampusia flandrica</i> , De Kon. ... | | | | | | | | |
| " " <i>striatula</i> , Von Koenen | | " <i>Daubret</i> , Stan. Meun. ... | | | | | | | | |
| " " <i>Sandbergeri</i> , Mayer ... | | " <i>Engina Heberii</i> , Mayer ... | | | | | | | | |
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| " <i>Nysti</i> , Desh. ... | | | | * | * | * | |
| " <i>turbinoïdes</i> , Desh. ... | | | | | | * | |
| " <i>Leroii</i> , Coss. and Lamb. (Desh.) | | | * | | | * | |
| <i>Raulinia alligata</i> Mayer.... | * | | | | | | |
| " <i>petrafixensis</i> , Coss. and Lamb.... | | | | | | | |
| <i>Cœcum Edwardsi</i> , Desh. ... | | | | | | * | |
| " <i>Carpenteri</i> , Desh. ... | | | | | | | |
| " <i>Turritella planospira</i> , Nyst ... | | | * | | | * | |
| <i>Vermetus stampinensis</i> , Coss. and Lamb. ... | | | * | | | * | |
| <i>Brachytrema Bohlayei</i> , Desh. ... | | * | | * | * | * | |
| <i>Cerithium petrafixense</i> , Coss. and Lamb. ... | | | | | | * | |
| " <i>Peroni</i> , Coss. and Lamb. ... | | | | | | * | |
| " <i>dissitum</i> , Desh. ... | | | * | * | * | * | |
| " <i>Debrayi</i> , Coss. and Lamb. ... | | | * | * | * | * | |
| " <i>undulosum</i> , Stan. Meun. ... | | | * | * | * | * | |
| " <i>Changarnieri</i> , Coss. and Lamb. ... | | | | | | * | |
| " <i>abbreviatum</i> , Braun. ... | | | | | | * | |
| " <i>jeuense</i> , Desh. ... | | | * | * | * | * | |
| " <i>Piettei</i> , Desh. ... | | | * | * | * | * | |
| " <i>Merceyi</i> , Coss. and Lamb. ... | | | | | | * | |
| " <i>multilineatum</i> , Desh. ... | | | | | | * | |
| " <i>lavissinum</i> , Schlot. ... | | | | | | * | |
| " <i>Colleai</i> , Coss. and Lamb. ... | | | * | * | * | * | |
| " <i>Weinkauffi</i> , Tourn. ... | | | * | * | * | * | |
| " <i>Barroisi</i> , Coss. and Lamb. ... | * | | | | | * | |
| " <i>consobrina</i> , Coss. & Lamb. ... | | | | | | * | |
| <i>Nassa Pellati</i> , Coss. and Lamb. <i>monplex</i> , Desh. ... | | | | | | * | |
| " <i>Murex Deshayesi</i> , Duchast. ... | | | * | | | * | |
| " <i>Berti</i> , Stan. Meun. ... | | | * | | | * | |
| " <i>conspicuus</i> , Braun. ... | | | | | | * | |
| " <i>ornatus</i> , Grat. ... | | | | | | * | |
| " <i>rhombicus</i> , Stan. Meun. ... | | | | | | * | |
| " <i>tenuellus</i> , Mayer ... | | | | | | * | |
| " <i>peregrin</i> , Beyr. ... | | | * | | | * | |
| " <i>Munieri</i> , Coss. and Lamb. ... | | | | | | * | |
| " <i>Margarita</i> , Coss. & Lamb. ... | | | | | | * | |
| <i>Zyphis cuniculosus</i> , Duchast. ... | | | * | | | * | |
| " <i>Schlotheimi</i> , Beyr. ... | | | * | | | * | |
| <i>Sistrum Baylei</i> , Coss. & Lamb. ... | | | | | | * | |
| <i>Columbella inornata</i> , Sandb. ... | | | | | | * | |
| <i>Coninella Gossardi</i> , Nyst ... | | | * | | | * | |
| " <i>Archambaultii</i> , Stan. Meun. ... | | | | | | * | |
| " <i>Fusus elongatus</i> , Nyst ... | | | | | | * | |
| " <i>Speyeri</i> , Desh. ... | | | * | | | * | |
| " <i>undatus</i> , Stan. Meun. ... | | | | | | * | |
| " <i>retroscosta</i> , Sandb. ... | | | | | | * | |
| " <i>Kæneni</i> , Coss. and Lamb. ... | | | | | | * | |
| " <i>filiferus</i> , Stan. Meun. ... | | | | | | * | |
| <i>Mitra perminuta</i> , Braun. ... | | | | * | | * | |
| " <i>Colleai</i> , Coss. and Lamb. ... | | | | * | | * | |
| <i>Volutilithes Rathieri</i> , Hébert <i>modesta</i> , Mérian ... | | | * | * | | * | |
| " <i>Marginella stampinensis</i> , Stan. Meun. ... | | | * | | | * | |
| " <i>Bezanconi</i> , Coss. & Lamb. ... | | | * | | | * | |
| <i>Olivella Prestwichi</i> , Mayer ... | | | * | | | * | |
| <i>Cancellaria Baylei</i> , Bezançon ... | | | * | | | * | |

V.P.F.N.

F.
N.

V.F.M.

V.N.

The following species of Pulmonata are cited by M. Deshayes as occurring in the Oligocene beds, chiefly in the Limestone of Beauce (including in part the *Helix*-Limestone of the Orléannais), and in the *Meulière Supérieure*; but, without a detailed examination of each species and the locality from which it was obtained, it is not possible for us to give the exact horizon as now defined by French geologists:—

| 69. PULMONATA. | 70. PULMONATA. | 71. PULMONATA. | 72. PULMONATA. |
|---|--|--|---|
| <i>Ancylus depressus</i> , Desh. <i>Bourgeoisii</i> , Desh. <i>Limnæa dilatata</i> , Noullet <i>urceolata</i> , Braun. <i>Noueli</i> , Desh. <i>reticulosa</i> , Desh. <i>inflata</i> , Brongn. <i>symmetrica</i> , Brard <i>cylindrica</i> , Brard <i>fabulum</i> , Brongn. <i>opina</i> , Desh. <i>stampinensis</i> , Desh. <i>condita</i> , Desh. <i>Tombecki</i> , Desh. <i>ventricosa</i> , Brongn. <i>cornea</i> , Brongn. <i>briarensis</i> , Desh. <i>Brardi</i> , Desh. | <i>Limnæa strigosa</i> , Brongn. <i>media</i> , Brard <i>Bronguarti</i> , Desh. <i>viridans</i> , Brard <i>minor</i> , Thomæ <i>parvula</i> , Desh. <i>melaniana</i> , Desh. <i>Denainvilliersi</i> , Desh. <i>Heberti</i> , Desh <i>Planorbis solidus</i> , Thomæ. <i>cornu</i> , Brongn. <i>Prevosti</i> , Brongn. <i>depressus</i> , Nyst <i>declivis</i> , Braun. <i>planulatus</i> , Desh. <i>inopinatus</i> , Stau. Meun. <i>Helix Lemani</i> , Brongn. <i>Noueli</i> , Desh. | <i>Helix Defraci</i> , Desh. <i>Morguesi</i> , Brongn. <i>Ramoudi</i> , Brongn. <i>aurelianensis</i> , Brongn. <i>Barrandei</i> , Desh. <i>Munieri</i> , Desh. <i>Beyrichi</i> , Desh. <i>Tristani</i> , Brongn. <i>Bronguarti</i> , Desh. <i>inoluta</i> , Thomæ <i>Sandbergeri</i> , Desh. <i>impresa</i> , Sandb. <i>disparilis</i> , Desh. <i>multicosata</i> , Thomæ <i>ferculum</i> , Desh. <i>euglypha</i> , Reuss <i>eumicron</i> , Desh. <i>Desmaresti</i> , Brongn. | <i>Helix stampinensis</i> , Desh. <i>dubia</i> , Desh. <i>Pupa anodon</i> , Desh. <i>edentula</i> , Desh. <i>parvula</i> , Desh. <i>coarctata</i> , Desh. <i>Defraci</i> , Brongn. <i>Munieri</i> , Desh. <i>Fischeri</i> , Desh. <i>globulus</i> , Desh. <i>bifida</i> , Desh. <i>turcica</i> , Desh. <i>Achatina electa</i> , Desh. <i>Sandbergeri</i> , Thomæ <i>aurelianensis</i> , Desh. <i>lubricella</i> , Sandb. |

NOTES ON THE LISTS OF MOLLUSCA.

In preparing the above lists we have, as already stated, taken the latest works by M. Cossmann as our basis; but we have found it necessary to make several alterations in the nomenclature, in addition to those proposed by M. Cossmann since the publication of his Catalogue. The list of Oligocene species is not as complete as we should wish; but the materials for an efficient revision are not at present available; we have, however, emended the lists which have been published as far as possible.

In accordance with their etymology and with the rules of Latin orthography, the names of several genera and species are here written in a manner slightly different from that usually adopted. In making these alterations, as well as in the invention of any new names required, we have benefited by the scholarship of our friend, Mr. F. A. Bather.

A few of the species, as defined by M. Cossmann, should, we think, be altered. Thus:—

Xenophora agglutinans (Lam.) is here substituted for *X. umbilicaris* (Sol.); the latter is a recent species, and differs from Barton and other Eocene forms.

Cerithium cornucopiæ, Sow., is restored in place of *C. Bedechei*, Bayan; the type of the latter appeared to us, on examination, to be merely a worn specimen of the former species.

Sycum subcarinatum (Lam.), though regarded by M. Cossmann as synonymous with *S. pirus* (Sol.), appears to us to be distinct, and is therefore reinstated.

Fusus aciculatus, Lam., is referred by M. Cossmann to *F. porrectus* (Sol.), but a careful comparison with typical specimens in the British Museum convinces us that the two are different; the former is therefore retained as a Paris Basin species.

The corrections that have been proposed by M. Cossmann since the publication of his Catalogue are as follows:—

Micreschara, Cossmann, instead of *Escharella*, Cossmann, 1888 (*non* D'Orb, 1852). See Ann. Geol. Univ., t. v. (1889), p. 1096.

Parascutum, Cossmann, instead of *Scutulum*, Monterosato, 1877 (*non* Tournouër). See Ann. Geol. Univ., t. vi. (1891), p. 883.

Mr. R. B. Newton, F.G.S., in his "Systematic List of the F. E. Edwards Collection of British Oligocene and Eocene Mollusca," issued August 22nd, 1891, has made various rectifications of certain genera, some of which affect the foregoing list as follows:—

- Batillaria**, W. H. Benson, 1842, = *Lampania*, Gray, 1840. List name only.
- Arctica**, Schumacher, 1817, = *Cyprina*, Lamarck, 1812. List name only.
- Bullinella**, R. B. Newton, 1891, = *Cylichna*, Lovén, 1846 (*non* Burmeister, 1844).
- Dissostoma**, Cossmann, 1888. As a genus, instead of a subgenus of *Cyclostoma*.
- Cossmannia**, R. B. Newton, 1891, = *Diastictus*, Cossmann, 1888 (*non* Mulsant, 1842).
- Triplex**, Humphrey, 1797, = *Pteronotus*, Swainson, 1840.
- Tomichia**, Benson, 1851, = *Euchilus*, Sandberger, 1872.
- Volvulella**, R. B. Newton, 1891, instead of *Volvula*, A. Adams, 1850 (*non* Oken, 1815).
- Lampusia**, Schumacher, 1817, instead of *Triton*, Montfort, 1810 (*non* Linnæus, 1767).

Mr. Newton has also made the following alterations in Ann. Mag. Nat. Hist., 1891. Ser. 6, vol. vii., p. 346.

- Hartmannia**, R. B. Newton, 1891, instead of *Pomatias*, Hartmann, 1821 (*non* B. Studer, 1789).
- Pomatias**, Studer, 1789, instead of *Cyclostoma*, Draparnaud, 1801 (*non* Lamarck, 1799).

Mr. E. A. Smith, F.Z.S., in the "Journal of Conchology," 1891, p. 333, substitutes **Viviparus**, Montfort, 1810, for *Paludina*, Lamarck, 1822.

We have made the following alterations of generic names; in some cases, because the name proposed in M. Cossmann's list was pre-Linnæan, and therefore inadmissible; in other cases for reasons which will be clear from the references given:—

- Rostellaria**, Lamarck, 1799 = *Gladius*, Klein, 1753. Pre-Linnæan name.
- Capiluna**, Gray, 1857, instead of *Glyphis*, Carpenter, 1856 (*non* Agassiz, 1843).
- Ranularia**, Schumacher, 1817 = *Gutturnium* (Klein, 1753), Morch, 1852.
- Cerithiella**, Verrill, 1882, instead of *Lovenella*, Sars, 1878 (*non* Hincks, 1868).
- Megalomatostoma** (Guilding, *em*), Swainson, 1840, *Megalomastoma*.
- Cerithioderma**, Conrad, 1860, instead of *Mesostoma*, Deshayes, 1861 (*non* Ant. Dujès, 1830).
- Mœrella**, Fischer, 1887, instead of *Mæra*, Adams, 1856 (*non* Leach, 1815).
- Danilia**, Brusina, 1865, instead of *Olivia*, Cantraine, 1835 (*non* Bertoloni, 1810).

- Lima**, Bruguière, 1792, instead of *Radula*, Klein, 1753. Pre-Linnæan name.
- Scala** (Klein, 1753), Humphreys, 1797, instead of *Scalaria*, Lamarck, 1801.
- Volutocorbis**, Dall, 1890 } Have been introduced as sub-genera
Volutopupa, Dall, 1890 } of *Volutilithes*.
- Pitar**, Römer, 1857 = *Caryatis*, Römer, 1862 (*non* Hübner, 1822).
- Aporrhais** (Klein, 1753), Da Costa, 1778 = *Chenopus*, Philippi, 1836.
- Divaricella**, E. von Martens, 1880, instead of *Cyclas* (Klein, 1753), Stoliczka, 1870 (*non* Bruguière, 1792, *nec* Lamarck, 1799).
- Corbicula**, we consider of generic rank.
- Colubraria**, Schumacher, 1817 = *Epidromus* (Klein, 1753), Morch, 1852.

The names of several genera and sub-genera of the Mollusca are pre-occupied; we are, therefore, compelled to substitute others. The names below are here proposed for the first time:—

SIMOCHILUS, Harris and Burrows.

Syn. *Platychilus*, Cossmann, 1888 (*non* Yakoblev, 1874).

Derivation, σιμός, flat, snubby; χείλος, lip.

STEGANOMPHALUS, Harris and Burrows.

Syn. *Eudora*, Leach, 1852 (*non* Péron and Lesueur, 1809).

Derivation, στεγανός, covered; ὀμφαλός, umbilicus.

TELEOSTOMA, Harris and Burrows.

Syn. *Pterostoma*, Deshayes, 1861 (*non* Germar, 1812).

Derivation, τέλειος, complete; στόμα, mouth.

CYRBASIA, Harris and Burrows.

Syn. *Tiarella*, Cossmann, 1889 (*non* Swainson, 1840).

Derivation, κυρβάσις; Persian royal hat, like a tiara.

EPETRIUM, Harris and Burrows.

Syn. *Stylia*, Jousseau, 1884 (*non* Robineau-Desvoidy, 182—).

Derivation, ἠπήτριον, a darning needle.

OGIVIA, Harris and Burrows.

Syn. *Metalepsis*, Jousseau, 1884 (*non* Grote, 1875).

Derivation, "Ogive," a pointed arch.

ARÆODACTYLUS, Harris and Burrows.

Syn. *Ischnodactylus*, Cossmann, 1889 (*non* Chevrolat, 1877).

Derivation, ἀραιός, thin; δάκτυλος, finger.

ANDONIA, Harris and Burrows.

Syn. *Genea*, Bellardi, 1871 (*non* Rondani, 1850).

Derivation, River Andona, near Asti.

PHLYCTIS, Harris and Burrows.

Syn. *Phlyctænia*, Cossmann, 1881 (*non* Hübner, 1816).

Derivation, φλυκτίς, a blister.

BATHYTOMA, Harris and Burrows.

Syn. *Dolichotoma*, Bellardi, 1875 (*non* Hope, 1839).

Derivation, βαθύς, deep ; τομή, cut, notch.

ASTHENOTOMA, Harris and Burrows.

Syn. *Oligotoma*, Bellardi, 1875 (*non* Westwood, 1836).

Derivation, ἀσθενής, weak, slight ; τομή, cut.

PERATOTOMA, Harris and Burrows.

Syn. *Homotoma*, Bellardi, 1875 (*non* Guérin-Méneville, 1829-1838).

Derivation, πέρας, end, boundary ; τομή, cut.

LIOCARENUS, Harris and Burrows.

Syn. *Fortisia*, Bayan, 1870 (*non* Rondani, 1861).

Derivation, λειοκάρηνος, bald-head.

MICRELASMA, Harris and Burrows.

Syn. *Anelasma*, Cossmann, 1889 (*non* Darwin, 1851).

Derivation, μικρός small ; ἔλασμα, a thin metal plate.

SPARTINA, Harris and Burrows.

Syn. *Thaumasia*, Albers, 1850 (*non* Perty, 1830-1834).

Derivation, σπάρτινη, a rope of esparto-grass.

When two generic names differ only in their terminal letter or letters, it is considered by some authors that only the first of these two names should stand. For instance, Mr. E. A. Smith has discussed this point in the *Journal of Conchology* (1891, p. 336), with reference to *Hydrobia*, and has replaced that name by *Paludestrina*, on the ground that it is pre-occupied by *Hydrobius* of Leach. Mr. R. B. Newton, too, in the *Geological Magazine* (1891, p. 202), has discarded Léveillé's *Porcellia* because Latreille called an Isopod *Porcellio*. Had we held similar views, it would have been incumbent on us to re-name many other genera than those cited above. Though we cannot commend such names, still they seem to us sufficiently distinct, especially when, as in the above instances, they designate genera in different zoological groups. Since, moreover, opinions are divided on this matter, we have preferred to await the adoption of a more definite rule than now obtains, rather than to coin new names which might have eventually to be abandoned. The principles on which we have proceeded throughout are well expressed by Profs. Cope and Kingsley in the *American Naturalist* for July, 1891, vol. xxv, p. 640.

APPENDIX I.

While the list of Mollusca already given was in the press, M. Cossmann most obligingly favoured us with a manuscript copy of the additions and revisions which will appear in the forthcoming supplement to his *Catalogue Illustré*. He proposes the following new names:—

HEROUVALIA, Cossmann = *Asaphinella*, Cossmann, *pars*.

PARVICORBIS, Cossmann = *Bernayia*, Cossmann.

DISTÆCTRIA, Cossmann = *Cylindrella*, Pfeiffer,

And the name **Eucyclus**, Deslongchamps, is substituted for *Amberleya*, Morris and Lycett.

The additional species, which we print verbatim, are as follows:—

| | L.L.E. | L.E. | M.E. | U.E. |
|---|--------|------|------|------|
| <i>Sphenia leptomorpha</i> , Coss. | * | | | |
| <i>Corbula aulacophora</i> , Morlet | | | | * |
| „ <i>spectabilis</i> , Desh. | * | | | |
| <i>Mæra Bouryi</i> , Coss. | * | * | * | |
| <i>Syndosmya Deshayesi</i> , Bosquet (= <i>brachyrhyncha</i> , Coss.) | | | | * |
| <i>Tellina hantoniensis</i> , Edw. | | | | * |
| <i>Scrobicularia ovoides</i> , Coss. | | | * | |
| <i>Arcopagia colpodes</i> , Bayan | | | | |
| <i>Herouvalia semitexta</i> , Coss. | | | | |
| <i>Asaphinella amygdalina</i> , Coss. | | * | | |
| <i>Venus Bouryi</i> , Coss. | | | * | |
| <i>Sunetta separata</i> (Desh.) | | | | |
| <i>Parvicorbis tellinopsis</i> , Coss. | | * | | |
| <i>Scintilla primæva</i> , Coss. | * | | | |
| <i>Lepton irradiatum</i> , Coss. | | * | | |
| <i>Montacuta subquadrata</i> , Coss. | | | | * |
| <i>Crassatella præcurata</i> , Coss. | | * | | |
| <i>Axinæa Bezanconi</i> (= <i>plumstediensis</i>), Sow. | | | | |
| <i>Modiola compsa</i> , Coss. | | * | | |
| „ <i>amaura</i> , Coss. | | * | | |
| <i>Arca scabrosa</i> , Nyst (= <i>subrudis</i> , D'Orb.) | | | | |
| <i>Fissurella Bouryi</i> (= <i>tapina</i> , Coss.) | | | | |
| <i>Norrissia anaulax</i> , Coss. | | | * | |
| <i>Collonia Houdasi</i> , Coss. | | | | * |
| „ <i>miliaris</i> , Coss. | | * | | |
| <i>Eucyclus infraecænicus</i> , Coss. | * | | | |
| <i>Scalaria Bowerbanki</i> , Morris (= <i>angariensis</i> , de Ryckh.) | | | | |
| „ <i>Stueri</i> , De Boury. | * | | | |
| <i>Adeorbis diaphanes</i> , Coss. | | * | | |
| „ <i>trochila</i> , Coss. | | | * | |
| <i>Ampullina Berthelini</i> , Coss. | | | * | |
| „ <i>chenayensis</i> , Coss. | * | | | |
| <i>Velutina Pezauti</i> , Coss. | | | * | |

| | L.L.E. | L.E. | M.E. | U.E. |
|---|--------|------|------|------|
| <i>Ceratia diaphanes</i> , Coss. ... | ... | | * | |
| <i>Chevallieria resecta</i> , Coss. ... | ... | | | * |
| <i>Lacuna antiqua</i> (Desh.)... .. | * | | | |
| <i>Lacunodon bidens</i> , Coss. ... | ... | * | | |
| <i>Bayania lirata</i> , Coss. ... | ... | * | | |
| <i>Paludomus infraoceanicus</i> , Coss. ... | ... | | | |
| <i>Mathildia sculptata</i> (Desh.) ... | * | | | |
| <i> bacillaris</i> , Coss. ... | ... | * | | |
| <i>Batillaria Stueri</i> , Coss. ... | * | | | |
| <i>Sipho Pezauti</i> , Coss. ... | ... | | * | |
| <i>Metula inaequilirata</i> (Desh.) ... | ... | | | * |
| <i>Mitra Chevallierei</i> , Coss. ... | ... | | * | |
| <i> Godini</i> , Coss. ... | ... | | * | |
| <i>Marginella eurychilus</i> , Coss. ... | ... | * | | |
| <i>Cancellaria Clæzi</i> , Coss.... | * | | | |
| <i>Actæon Bernayi</i> , Coss. ... | ... | | | * |
| <i>Siphonaria liancurtensis</i> , Coss. ... | ... | * | | |

APPENDIX II.

M. G. Dollfus, in reading over the proofs, has reminded us that the Sands of the Soissonais have been divided by M. Watelet into three horizons as follows:—

Upper: Sands of Visigneux.

Middle: Sands of Cuise.

Lower: Sands of Aizy.

The upper horizon is typically developed at Visigneux, about four miles south of Soissons, and is particularly characterised by the abundance of *Turritella*; it has a wide extension, and is again met with in Flanders.

INDEX TO GENERA AND SUBGENERA OF MOLLUSCA.

The Synonyms are printed in Italics.

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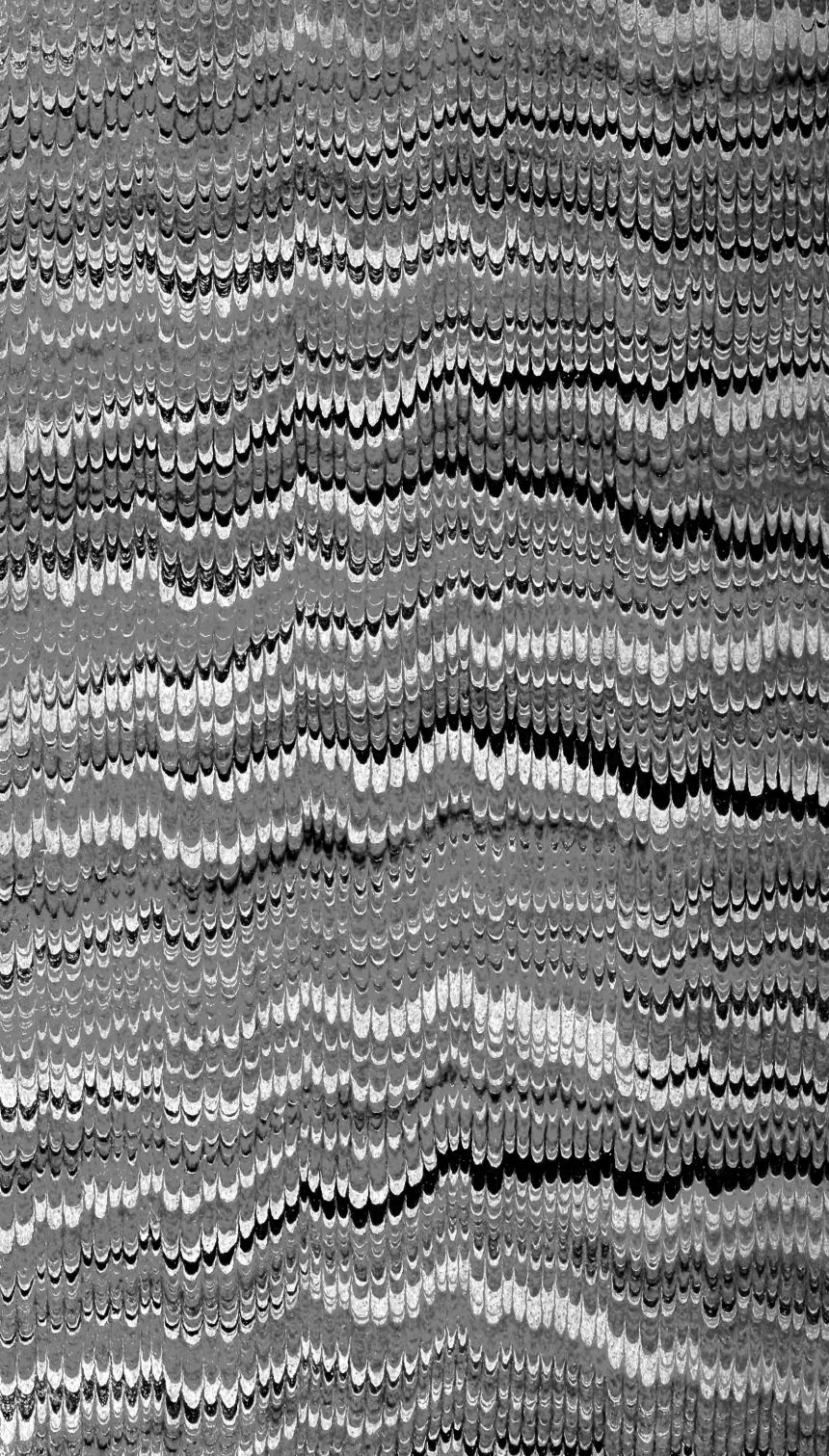
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