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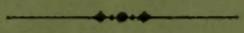
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On two new British Nudibranchiate Mollusca, by Rev. A. M. Norman,
M.A., 1877, 8vo., pp. 3. [The Author.
The American Naturalist.—Edited by Prof. A. S. Packard, jun., Nov.—
Dec., 1877, 8vo. [The Editor.
The Naturalist.—Edited by C. P. Hobkirk and G. T. Porritt, F.L.S.,
Dec., 1877, 8vo. [The Editor.
Jahrbücher der Deutschen Malakozoologischen Gesellschaft, Oct., 1877,
8vo., pp. 90 and 4 plates. [The Editor.
Proceedings of the Academy of Natural Sciences of Philadelphia,
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Chairman,

There are certain characters common to the whole region, and even certain species very widely distributed; these we will therefore consider first.

Leucochroa is almost exclusively Mediterranean, a few species only being found in the Atlantic Islands. *Gonostoma* is also almost a purely Mediterranean group. *Campylea* is very abundant, especially in the mountains. Of the group *Pentatania* a few species only are found north of the Alps, and even those are almost all Mediterranean also, and the great bulk of the group are exclusively so. For instance the common British shell, *Helix aspersa*, attains a much larger size in Italy than in England. It is very difficult to believe that so abundant a British species has been introduced, but judging from the reduced size of English specimens, England would, to say the least, not appear to possess the most favorable climate for this mollusc. The *Xerophila* are exclusively Mediterranean, except a few species, such as *H. pisana* and *variabilis*, which also extend along the coasts of the Northern Region, and a few from the Atlantic Islands.

The *Bulimini*, though extensively distributed in other parts of the Old World, yet in Europe are found almost exclusively south of the Alps. The only European *Stenogyra*—*decollata*—is Mediterranean, and in the genus *Pupa* the subgenera *Torquilla* and *Sphyradium* are almost peculiar to our region. Of the genus *Clausilia* we will speak more at length under the Divisions A and B. In the operculate shells, *Leonia* is exclusively Mediterranean, and the only species of *Cyclostomus* that extends to the north of the Alps is *C. elegans*.

A. The Austro-Turkish Division. We consider this Division, the richest of all in species, to be clearly marked by the immense abundance of *Buliminus* and *Clausilia*. With regard to the former genus, it may be well to mention for the information of those who have not access to foreign conchological literature, that

the genus *Bulimus*, in the modern acceptation of the term, is not found in Europe. The majority of the species (including the British *B. obscurus* and *montanus*) are referred to *Buliminus*, whilst a few (such as the British *B. acutus* mentioned above) are included in *Helix*, subgenus *Xerophila*, section *Cochlicella*, and *B. decollatus* is a *Stenogyra*. The subgenus *Zebrina* (19 species) is altogether Austro-Turkish, except *B. detritus*, which is also found over a great part of the rest of Europe. Of *Napæus* (24 species) 15 are found here only, *Petraeus* (16 species) is special to this Division, and 37 out of 43 species of *Chondrula* occur here. The *Baleo-Clausilia*, which form a connecting link between *Balea* and *Clausilia*, are all Transylvanian, and the curious genus *Zospeum* has 9 species from the caves of Carniola, a tenth species being from the Spanish Pyrenees.

The distribution of *Clausilia* is very interesting, and as we are now treating of its metropolis, the opportunity seems a good one to consider it generally. From the Balkan Peninsula and its neighbourhood, where it occurs in a profusion of subgeneric forms, the genus appears to have sent out a comparatively large colony to the Italian Peninsula and Sicily, between 40 and 50 species, chiefly of the subgenera *Medora*, *Marpessa*, *Agathylla* and *Delima*. More to the west and north the numbers are very small; most of the northern species belong to the s.g. *Iphigenia*, e.g. *C. ventricosa*, *Rolphii*, *parvula*, *nigricans*, *cruciata* and the remarkable Pyrenean *C. Pauli*. Three species are found in Madeira, and going further west and crossing the Atlantic, we find the peculiar s.g. *Nenia*, represented by one species in Porto Rico—*C. tridens*, and by several, *C. Blandiana*, *exarata*, etc., among the Andes of South America. Throughout the rest of the New World there are none except the one species from Alaska already mentioned. To the south of its metropolis, *Clausilia* is very poorly represented; two or three species have been found in Algeria, and two in the Abyssinian region—*C. sennaarensis* and *dyscherata*; but to the

east it is quite different. Asia Minor, Syria, and the Caucasus are all rich in *Clausilia*, second only to the Balkan Peninsula, and indeed it is doubtful whether they be not equally rich, allowing for the smaller amount of exploration. The prevalent subgenera are somewhat different. In the Balkan Peninsula and Austria the most largely represented subgenera are *Alopi*a, *Marpessa*, *Fusulus* (chiefly Austrian), *Agathylla*, *Medora* (chiefly from the archipelago), *Delina* and *Herilla* (Austrian), and *Papillifera*. In Asia the prevalent subgenera appear to be *Laciniaria* and *Idyla*. *Alinda* is pretty evenly distributed, and *Mentissa* is equally Asiatic and Crimean. Passing to the East, we find that several species have been discovered in Persia, by the Italian Expedition, and we may conclude that thence the genus has spread through Affghanistan to the Himalayas, where there are several species belonging to the exclusively Eastern subgenus *Phædusa*. In the plains of India proper and the detached mountains of the Indian Peninsula the genus seems to disappear, but strange to say one species has been found in Ceylon. To the eastward it spreads through the Khasia and Cachar Hills to the Indo-Malayan Peninsula, where many species remarkable for their size, beauty, and peculiar form have been discovered, as *C. ovata*, *bulbus* and *Philippiana*, near Moulmein, and the wonderful *C. Mouhoti* in Cambodia. China and Japan, though comparatively unexplored, have already yielded several species; the latter especially is remarkable for fine forms, including *C. Yokohamensis* and *C. Reiniana*, which perhaps surpass even the magnificent *C. Mouhoti*. To the East the genus appears to die out, though there are several species in Sumatra and Java. In Borneo there are two, in the Philippines and the Moluccas there are one each. Finally, the one Alaskan species must be mentioned.

We have been induced to make this digression in order to explain at one view the distribution of this interesting genus, and

will now return to the Austro-Turkish Division. In the genus *Helix* the section *Carthusiana* is principally found here, and *Campylæa*, though also tolerably abundant in Italy, has more representatives here than elsewhere. *Levantina* is exclusively found in Asia Minor and Cyprus, and *Pomatia* may be considered as chiefly Austro-Turkish. The only Palearctic species of *Tornatellina* occur near Jerusalem. *Xerophila*, though well represented here, is perhaps more of a western subgenus, and *Iberus* and *Macularia* are almost absent. On the other hand, of the true *Zonites* all but one (*Z. algirus*) are peculiar to this Division, and *Mesomphix* (subgenus of *Hyalina*) has some fine forms in the Caucasus.

Central Asia is as yet imperfectly known, and it is doubtful where the boundary between the Northern and Mediterranean Regions should be fixed. Our knowledge of it is principally derived from V. Martens' "Fedtschenko's Reise in Turkestan," which, notwithstanding its German title, is unfortunately printed in the Russian language, so that only the Latin diagnoses, list of species, and the plates are available for the vast majority of European naturalists. The presence of the Palearctic and Australasian genus *Macrochlamys* is remarkable, as is also that of a species of *Cydotus*. There are 5 species of *Buliminus*. Along with these are many northern forms, *Hyalina nitida* and *fulva*, *Helix costata*, *Cionella lubrica*, etc.

B. The Italian Division (including the South of France). This may be considered as occupying an intermediate position between the others. The genus *Clausilia*, so abundant in the Austro-Turkish Division, is, as we have seen, well, but not commonly, represented. *Buliminus* has but few species. The s.g. *Campylæa* is abundant, and we now come upon many of the forms characteristic of the western portion of the Mediterranean, *Macularia* for instance. *Iberus* belongs almost exclusively to this Division.

Stenogyra decollata is very abundant. The curious *H. nautiliformis* (section *Drepanostoma*) is found in the Italian Lake District. Sicily has many forms peculiar to itself, especially a group of very strongly costate Clausiliæ, *C. syracusana*, *Grohmanniana*, now made into a subgenus under the name of *Siciliaria*. Corsica and Sardinia have already yielded some distinct forms, and will probably produce more when better explored. Even the small islands, like Malta, Lampedusa, etc., have distinct species. Malta has, amongst others, *Helix (Iberus) melitensis*, *H. (Xerophila) meda*, *Clausilia oscitans*, *delicata* and *mamotica*, and *Cyclostomus melitensis*. In Lampedusa is found *Clausilia Lampedusæ*.

C. The Hispano-Algerian Division. Possibly the Spanish Peninsula and Africa would be better separated, but there are so many species, especially amongst the *Macularia* common to both, that we are unwilling to multiply divisions for the present. In this we have the direct opposite of the Austro-Turkish Division. *Clausilia* and *Buliminus* are almost absent, whilst *Macularia* is in immense numbers, 24 species out of 31. *Leucochroa* is represented by several curious forms, especially in Morocco (*L. turcica*, *Mogadorensis*, *degenerans*, &c.) *Fruticicola*, so abundant in the rest of Europe, is comparatively scarce here, doubtless on account of the dry climate and scarcity of deciduous trees. *Campylæa* and *Pomatia* also are almost absent. *Xerophila*, on the contrary, is fairly represented. A large number of species of *Cionella* (especially of the subgenera *Azeaa*, *Ferussacia*, and *Acicula*, have been described from Algeria, but it is doubtful how many are good species. With regard to the *Cyclostomidæ*, this Division is remarkable for possessing the only two species of *Lconia*, *mamillarisis*, common to Spain and Algeria, and *scrobiculata*, lately discovered in Morocco, and the only European *Tudora*, *T. ferruginæa*, found in the Balearic Islands and at Gibraltar. A speciality of this fauna, caused doubtless by the dry climate, is the prevalence of white calcareous shells.

3. *THE ATLANTIC REGION.*—The fauna of the Archipelagoes forming this region are so diverse that they might almost be considered distinct, but they have certain features in common. Geological research has shown these Islands to have been the result of separate volcanic upheavals, and that they are not fragments of a former Atlantis, as was at one time supposed. The subgenus of *Helix*, *Leptaxis*, and the operculate genus *Craspedopoma* are specially characteristic.

A. *The Azores.* These islands are known chiefly from the researches of Morelet and Drouet, of which the results were published in 1860 by Morelet (Notice sur l'Histoire naturelle des Açores). 69 species were described, 28 being European shells of wide distribution and several others common to the other Atlantic Islands, as *Helix paupercula* to Madeira and the Canaries, *H. armillata* to Madeira and the Cape de Verdes, *H. erubescens* to Madeira. 33 species only are peculiar. The most striking features of the fauna are no less than 7 species of *Vitrina*, of moderate size, 6 species of *Leptaxis*, 3 peculiar *Hyalinæ*, several *Bulimini* of the s.g. *Napeus*, 5 species of *Pupa*, of a peculiar group, allied to those of Madeira, and one *Craspedopoma* (*C. hespericum*).

B. *The Madeira Archipelago*, comprising Madeira, Porto Santo, the Desertas, and a few islets; perhaps the most thoroughly worked ground out of Europe. Lowe, Albers, Wollaston, and Castello de Paiva are the most distinguished names in Madeiran conchology. Albers published a monograph many years ago, giving figures of all the species, but the more recent work of Castello de Paiva is naturally the most complete enumeration, and all the species and varieties are fully described, though only the novelties are figured.

The fauna of Madeira is far more special than that of the Azores. There are 1 sp. of *Arion*, 4 of *Limax*, 2 of *Testacella*, 3 of *Vitrina*, 93 of *Helix*, 1 of *Stenogyra*, 11 of *Cionella*, 25 of

Pupa, 3 of *Clausilia*, and 4 of *Craspedopoma*. The extra Madeiran distribution of some of these has formed the subject of a paper by the Rev. R. B. Watson in the 1876 volume of "The Journal de Conchyliologie." Mr. Watson enumerates 28 species as common to Madeira and other localities, of which 25 are found in Europe, and also for the most part in some of the other Atlantic Islands, whilst *H. paupercula* occurs in the Azores and Canaries, *H. armillata* in the Azores, and *Vitrina Teneriffæ* in the Canaries.

It may be remarked how this proportion of indigenous species, of species common to two or more archipelagoes, and of European shells (the latter chiefly introduced) bears out the theory of the separate origin of the different groups of islands. Had they ever formed part of an Atlantis, we might have expected to find a large proportion of shells common to all the groups, some few peculiar species in each, and a few common to the Atlantis and Europe. Instead, we find in all the groups, except the Azores, a vastly preponderant number of purely local forms, very few common to two or more groups, and a certain number of European shells of wide distribution, many probably introduced by human agency; and, with regard to the Azores, the preponderance of European forms is due rather to the poverty of the local fauna than to an absolutely greater number of introduced species. The most characteristic Madeiran groups are *Helix* s.g. *Leptaxis* (9 species), *Janulus* (3), *Actinella* (17), *Octephila* (22), *Craspedaria* (2), *Plebecula* (5), *Tectula* (11), *Lampadia* (1), *Crenca* (2), *Cionella* (11), *Pupa* s.g. *Charadrobia* (14), *Eryma* (5), *Craspedopoma* (4).

We may state here, once for all, that it is impossible for us to enter upon the subject of the detailed distribution of species in the separate islands of a division without extending this paper to an inordinate length.

C. **The Canaries.** Until a few years ago these islands were comparatively unknown, but recently the principal islands have

been explored by Fritsch and Wollaston, and Professor Mousson (Révision de la Faune des Iles Canaries) gives a good account of the land mollusca. The following are the numbers: *Limax* (3), *Plectophorus* (1), *Parmacella* (3), *Testacella* (2), *Vitrina* (6?), *Hyalina* (8), *Helix* (109), *Buliminus* (24), *Stenogyra* (1), *Cionella* (10), *Pupa* (11), *Cyclostomus* (4), *Craspedopoma* (1), *Pomatias* (1). 15 species are cited by Mousson as European. We have already mentioned the few species common to the Canaries and Madeira or the Azores. It, therefore, follows that almost all the Canarian species are peculiar, thus confirming what we have just stated in considering the Madeiran shells. The most prevalent characteristic groups are *Vitrina* (6 species), *Helix* s.g. *Monilcaria* (9), *Discula* (6), *Gonostoma* (7), *Iberus* (8), *Hemicycla* (26), *Buliminus* s.g. *Napæus* (20), *Pupa* s.g. *Charadrobis* (3). The s.g. *Leptaxis* is comparatively poorly represented by 2 species, and this is the extreme limit of the s.g. *Leucochroa*, represented by 3 species. *Clausilia* has not been found. The *Pomatias* (*P. Bartholemianum* Shuttl.) is considered as doubtful, the only authority for assigning it to the Canaries being one specimen so marked in the Marseilles Museum. M. Mousson shows, by an examination of the various groups, that not only are there scarcely any species common to Madeira and the Canaries, but that many of the subgenera are different, or represented in very different proportions in the two Archipelagos. (It may be well to state that the "Love" of the text of Professor Mousson's work is a misprint for "Lowe," the name is right enough in the plates, but strange to say almost always mis-spelt in the text).

D. The Cape de Verdes are miserably poor in mollusca. Most of the few that exist were discovered by Dr. Dohrn, who published the fauna of the islands in the "Malakozoologische Blätter" for 1869. There are 3 species of the s.g. *Patula*, 6 of *Leptaxis* (the characteristic group), 1 of *Cionella*, 2 of *Buliminus*, 4 of *Pupa*, and 2 of *Succinea*. This wretched fauna is due to the arid climate of the Islands.

III. **The Ethiopian Province.**—We include in this Province all Africa to the south of the Sahara, and the southern part of Arabia. At two points only are its boundaries ill defined, along the course of the Nile (Abyssinia even has certain shells of a Palæarctic facies, and we do not know where the purely Mediterranean fauna begins in Nubia), and similarly on the narrow zone of comparatively fertile land on the Atlantic side, though the fauna of Senegambia is purely Ethiopian and that of Morocco Mediterranean, the point of contact between the two is undetermined. Elsewhere the Sahara forms an impassable barrier. We come here upon a perfectly distinct fauna from those we have hitherto met with; its principal features are the abundance of *Achatinæ* and allied genera—*Perideris*, *Limicolaria*, etc., and of *Enneæ*, together with, on the whole, a comparative scarcity of *Helices*, those that are found being of different subgenera from the *Helices* of the Palæarctic Province. *Pupa* is rather poorly represented. *Clausilia* exists only in Abyssinia. *Cionella* has completely disappeared. On the other hand, *Nanina* and *Streptaxis* appear for the first time.

The division of this Province must as yet be imperfect, the interior being insufficiently explored. We may, however, recognise the following regions:—

1. *THE WEST AFRICAN.*
2. *THE SOUTH AFRICAN.*
3. *THE EAST AFRICAN.*
4. *MADAGASCAR.*
5. *THE MASCARENES AND SEYCHELLES.*
6. *ABYSSINIA.*

1. *THE WEST AFRICAN REGION.* This region, extending from Senegambia to about the southern tropic, can hardly be subdivided. Our knowledge of it is chiefly derived from Morelet's works, especially as to the southern part, and we would recom-

mend all who wish to study this fauna to consult that author's "Voyage du Dr. Welwitsch dans les royaumes d'Angola et de Benguela," and "Séries Conchyliologiques 1^{re} livraison." *Nanina* is pretty abundant, especially the subgenus *Thapsia*. *Streptaxis* has several species, including the fine *S. nobilis* from Liberia. *Helix* proper is almost absent. *Ennea* are numerous. Of *Buliminus* there are 15 species of the s.g. *Rhachis*. A peculiar group of shells is found, referred by some to *Glandina*, but more probably belonging to *Stenogyra*, *S. Fraseri*, etc. *Limicolaria*, *Perideris* and *Achatina* are very fine and abundant, indeed this may be considered the metropolis of that group. The fine genus *Pseudachatina* is peculiar. Operculate shells are excessively rare. Only two species of *Cyclophorus* have been recorded. One species of *Carychium* has occurred.

PRINCE'S ISLAND, in the Gulf of Guinea, has an interesting fauna. Besides a few species of the Continental genera, there are four of the curious genus *Streptostele* and two of *Columna*. *Nanina Polini* and *Adansonie* belong to a peculiar conical group and *Achatina sinistrorsa* is remarkable, not only for the reason implied in its name, but from its large size for a species of so small an island. St. Thomas and Fernando Po are less rich, or perhaps less explored, each has a species of *Pseudachatina* and in the former is found the curious *Achatina? barbiger*.

2. SOUTH AFRICAN REGION. In this region, of which the northern boundary may be taken to be the Tropic of Capricorn, we have a fauna which, while it has some features in common with the Western Region, has also many striking peculiarities. *Achatina* of large size still occur, and 1 species of *Limicolaria* has been found. *Ennea* is pretty abundant, especially in Natal. On the other hand, the true *Helices* re-appear, the principal subgenus being *Pella* (27 species), a group almost peculiar to the Cape. There are 6 species of *Dorcasia* (*H. globulus*, etc.), 1 *Æiople*,

1 *Phasis*, and 1 *Ampelita*. *Buliminus* is represented by 8 species and *Stenogyra* by 4. There are 3 *Pupæ* of the remarkable sinistral s.g. *Faula*, and 5 of more normal form; and there is a species of *Celiaxis*. The operculate shells are not quite so scarce as in Western Africa; they number *Cyclotus* 1, *Cyclophorus* 2, *Tropidophora* 1, *Cyclostomus* 3, *Tudora* 1, *Realia* 1.

THE ISLAND OF ST. HELENA can scarcely be referred to any African Region, the reference of the subfossil *Bulimus auris-vulpina* to *Pseudachatina* being doubtful. 3 *Succinæ* are found, 1 belonging to s.g. *Helisiga*. 1 *Helix* has been referred to *Charopa*, and 2 to *Endodonta*, both these being Australasian genera, whilst another has been considered to be a *Cochlostyla*.

TRISTAN D' ACUNHA has yielded nothing more than the 2 *Baleæ* mentioned by Woodward.

3. EAST AFRICAN REGION. Dr. Selater considers Madagascar as a sub-province, under the name of the Lemurian. If such a division is to be adopted for the Mollusca, we think it would be advisable to include in it our regions 3, 4 and 5, and characterize it by the abundance of *Cyclostomideæ*, especially *Tropidophora*, *Cyclostomi* of similar form, and *Otopoma*. In the region we are now considering we may define three divisions, rather, however, geographical than zoological—the mainland of East Africa with Zanzibar, the Comores, and Arabia with Socotra.

A. *East Africa*. Two species of *Trochomorpha*, 1 of *Streptaxis*, 2 of *Ennea*, 10 of *Buliminus*, 1 of *Cylindrus*, 5 of *Achatina*, 2 of *Otopoma*, 2 of *Tropidophora*, and 1 of *Cyclostomus* have been recorded. One species has been referred to *Glandina* (*G. Boivini*) and 1 to *Electra*, but the former being an American and the latter an Indian genus, we consider these identifications as doubtful.

B. *The Comores*. These islands have 1 *Vitrina*, 1 *Thapsia*, and 2 *Dorcasia*, besides a few species of the genera also found on the mainland.

C. *Arabia and Socotra*. This arid region has a peculiar fauna of the same cretaceous aspect that we noticed in North Africa, though the genera are different. 11 species of *Buliminus*, 4 of *Otopoma*, 2 of *Tropidophora*, and 3 of the peculiar genus *Lithidion* are its principal features.

4. *MADAGASCAR*. This island is much better known now than in Woodward's time, and if it has not fully come up to the rather extravagant expectations formed, has at least furnished many fine species. Its fauna is principally distinguished by the abundance of magnificent species of *Cyclostomidæ* of typical form (*Tropidophora* 24 species, *Cyclostomus* 30, *Otopoma* 3, *Lithidion* 1), and by *Helices* of the s.g. *Ampelita* (including *sepulchralis*, *omphalodes*, etc.) 26, and the splendid s.g. *Helicophanta* (*H. magnifica*, *Souverbiana*, etc.), 9 species. The genus *Euptychia*, recently described by Crosse and Fischer, is very curious, possessing transverse lamellæ, the only other instance of this in the *Cyclostomidæ* being *Cyclophorus foliaceus* from the Andamans. The presence of a species of *Cochlostyla* (*C. viridis*) is curious. There are also 2 species of *Nanina* that have been referred to *Xesta*. 3 very large species of *Achatina* and 6 of *Ennea* exist, a proof of the affinity of the fauna to that of the mainland of Tropical Africa.

5. *THE MASCARENES AND SEYCHELLES*. The fauna of these islands is not, as might have been thought likely, a mere offshoot of that of Madagascar, but on the contrary, almost as distinct from the Malagasian fauna as the latter is from that of the mainland. Though all the islands have peculiar species, some features are common to them all; the abundance of *Gonospira*, a genus formerly confounded with *Pupa*, but now found to be carnivorous, and placed near, or even joined to *Ennea*, the existence of *Nanina* in tolerable numbers, and the rarity of true *Helices*. All have been well explored. An excellent account of the mollusca, both terrestrial and marine, of Réunion has been published by

Deshayes, and the fauna of the little island of Rodriguez has been monographed by Crosse. We are not aware of any monograph of the fauna of Mauritius, but, though it has to be sought for in various publications, the malacology of Mauritius is about the best worked out of any. The Seychelles are perhaps not so fully explored as the rest of the Region, but still are very fairly known.

A. *Mauritius*. The genus *Nanina* is abundant, and contains some peculiar forms (*Erepta* and *Stylozon*). *H. inversicola*, formerly referred to *Caraculus*, has also been shown by Messrs. Binney and Bland to be a *Nanina*. The species of *Gonospira* are very numerous (27), and there are 3 of the peculiar genus *Gibbus*. There is 1 *Hainesia*. *Realia*, a genus we shall often meet with again, is represented by 10 species. The typical *Cyclostomidae* are not so very numerous as in Madagascar, nevertheless there are 2 species of *Otopoma*, 1 *Cyclotopsis*, 2 *Tropidophora*, and 2 *Cyclostomus*. 1 species has been referred to *Simpulopsis*, which must be considered rather doubtful, and 1 to *Tornatellina*.

B. *Reunion*. There is one species of *Vitrina*, a genus absent elsewhere, in the East of Africa. There are several *Naninae* (including 1 *Xesta*), 6 species of *Gonospira*, 1 *Tornatellina*, and 4 species of *Realia*.

C. *Rodriguez*. Except a species of *Streptaxis*, all the shells of this island are of the same genera as those of Mauritius and Réunion.

D. *Seychelles*. The shell formerly called *Helix unidentata*, now *Nanina (Stylozon) unidentata* is characteristic of these islands, which have also the following genera, not found in Mauritius, etc., *Hyalina* 1, *Streptaxis* 1, *Streptostele* 1 (a genus only occurring elsewhere in Prince's Island, on the West Coast), *Cyathopoma* 1 (an Indian genus), *Leptopoma* 1 (a genus of the East Indian Archipelago), *Helicina* 1 (the first appearance of this genus).

6. *ABYSSINIA* is comparatively badly explored, but Blanford, Issel, and Jickeli have made us acquainted with some portions. Issel's discoveries have been published by Morelet. Jickeli has given us a work on the fauna of N. E. Africa. As already stated, the fauna has evidently received some additions from the Palæarctic Province; this will be seen by the following list, where the Palæarctic genera, etc., are in italics: *Vitrina* 20, *Succinea* 2, *Acanthinula* 1, *Hemiplecta* 2, *Hyalina* 2, *Pella* 1, *Euparypha* 1, *Patula* 4, *Monacha* 1, *Buliminus* 5, *Cylindrus* 1, *Stenogyra* 8? *Limicolaria* 9, *Achatina* 1, *Homorus* 2, *Pupa* 14, *Clausilia* 2. The presence of a species of *Pella*, of which all the others are from the Cape, is remarkable, as is also the total absence of the operculate shells.

IV. **The Palæotropical Province.** We include in this Province, India, Ceylon, the Transgangetic Peninsula, the Andamans and Nicobars, China with Formosa, Japan and the Loochoo Islands, the Philippines, Borneo, Sumatra, Java and the other East Indian Islands, to and inclusive of Bali. To the west, the boundary between it and the eastern portion of the Mediterranean Region is undetermined, and to the north there is probably no certain limit. *Amooria* is almost completely Palæarctic, whilst South China is as clearly Palæotropical. In Japan, even, there is a certain mixture of northern forms. This Province is one of the richest, or perhaps the richest of all, both in genera and species. The faunæ of the separate regions differ a good deal, but the following may be taken as general characteristics: *Vitrinæ* are abundant, especially those now referred to *Helicarion*. *Nanina* is most richly represented, and by many magnificent species. *Trochomorpha* is found almost everywhere. The *Amphidromi* occur almost throughout the region. The operculate shells attain a development unparalleled elsewhere in the Old World, though strange to say true *Cyclostomi* scarcely exist, but *Cyclophorus* and *Cyclotus*, with their allies are most abundant, and we now come

upon the *Diplommatinacea*, the *Pupinacea*, and the various genera with sutural tubes, such as *Alycaeus*, *Opisthoporus*, etc. *Helicina* also first occurs in any numbers in this Province, though it is not so rich as in the Australasian and Palearctic Provinces.

1. **India.** Very much has been done in this -Region since Woodward's time. Blanford, Beddome and Godwin Austen deserve special mention, and Hanley and Theobald have published the "Conchologia Indica," which, though it contains no descriptions, and sometimes leaves something to be desired in the execution of the plates, has at least the merit of giving, for the first time, an illustrated catalogue of all the Indian mollusca. *Vitrina* has 12, *Succinea* 10 species. There are 2 species of the curious genus *Lithotis*, separated from *Succinea*. *Nanina* includes 26 species of *Macrochlamys*, 11 of *Xesta*, 13 of *Ariophanta*, besides many others not yet referred to subgenera. There are 6 species of the curious subgenus *Plectopylis*. *Arionta* has 1 species, *Fruticicola* 1, *Plectotropis* 2, *Eurystoma* 1, *Trachia* 5, *Planispira* 1, *Coilla* 5, *Oxytes* 1. The peculiar genus *Boysia* occur here. *Streptaxis* has 4 species, and *Ennea*, though more African than Indian, 6. We come for the first time on *Amphidromus* (2 sp.), and *Geotrochus* 1. There are 46 species of *Bulinus* and 5 of *Cylindrus*, the latter from the N.W. portion of the region, in the vicinity of the Palearctic Province. The genus *Electra* (or *Glessula*) is highly characteristic of the Indian Provinces and Ceylon. Here there are no fewer than 53 species. 1 species has been referred to *Spiraxis*. As already mentioned, there are several species of *Clausilia* in the Himalayas. The following are the operculate genera: *Cyclotus* 2 species, *Mychopoma* 2, *Cyathopoma* 21, *Spiraculum* 3, *Pterocyclos* 6, *Alycaeus* 53, *Opisthostoma* 5, *Diplommatina* 29, *Nicida* 6, *Scabrina* 1, *Cyclophorus* 29, *Lagocheilus* 1, *Ditropis* 3, *Tropidophora* 1, *Otopoma* 1, *Cyclotopsis* 1, *Pupina* 1, *Megalomostoma* 2, *Cataulus* 1, *Streptaulus* 1, *Pomatias* 2, *Realia* 1, *Georissa* 2. The existence of 2 species of *Pomatias* so far away

from Europe is very remarkable. The genus *Camptonyx* must almost be included amongst the terrestrial shells, though belonging to the *Limnæidæ* and *Cremnoconchus*, one of the genera of *Littorinidæ*, is purely terrestrial. This is after all only the extreme of what we see in *Littorina rudis*, which is often found where only the spray can reach.

2. *Ceylon*. This island has special features. Besides a number of genera also found in India, the following occur: *Acavus* (*Helix hæmastoma*, etc.) 8, *Aulopoma* 4, *Leptopoma* 3. *Cataulus* is almost exclusively Cingalese, 14 species occurring here and only one on the mainland. On the other hand, *Diplommatina* has but few representatives, 2 only. The species are almost all different from those of the mainland.

3. *The Transgangetic Peninsula*. The fauna of this Region, though on the whole very similar to that of India, yet is marked by a still greater variety of the operculate genera, especially by the strange form *Hybecistis*. *Amphidremus* also appears in numbers, and *Clausilia* are more numerous and of finer forms. We divide this region into

A. *Burmah* with the Tenasserim Provinces.

B. *Siam* with the remainder of the Peninsula of Malacca.

C. *Cochinchina* and *Cambodia*.

A. *Burmah*. *Nanina* is very well represented, including the peculiar subgenera *Sophina* 4 species and *Sesara* 7. There are some fine *Vitrinæ* (*Helicarion*) as *V. præstans*. In the genus *Helix* the s.g. *Plectopylis* is chiefly remarkable. *Streptaxis* has 9 species. The curious genus *Plectotropis* occurs here (3). There are no less than 14 species of *Clausilia*. *Electra* still occurs, but not so numerous as in India and Ceylon (5 species). The operculate fauna is particularly rich, comprising *Opisthaporus* 1, *Rhoistoma* 1, *Spiraculum* 2, *Pterocyclos* 4, *Alycaeus* 17, *Hybocistes* 1, *Diplommatina* 7, *Palaina* 1, *Clostophis* (rather a problematical genus,

founded on a single specimen, since lost) 1, *Scabrina* 2, *Cyclophorus* 20, *Lagocheilus* 2, *Leptopoma* 1, *Megalomastoma* 1, *Rhaphaulus* 2, *Pupina* 2, *Helicina* 2, *Georissa* 9.

B. *Siam* is not so well known as Burmah. The genera are very much the same, except that *Sesara*, *Sophina* and *Plectopylis* do not occur, or at least have not yet been found. *Amphidromus* is much more abundant (13 species) *Clausilia* less so (4). No *Helicina* or *Georissa* has been found, and, on the other hand, there are 5 species of *Realia*.

C. *Cochinchina* and *Cambodia* were until lately almost unknown, and even now have only been very partially explored. The 4th part of Morelet's "Séries Conchyliologiques" gives a résumé of all that is known of the fauna. The *Naninæ* known are less numerous than those of Burmah and Siam, but include the magnificent *N. Cambojensis*. Two species have been referred to *Zonites*. In the true *Helices* there is 1 *Planispira*, showing the affinity with the East Indian Archipelago. One has been referred to *Ophiogyra*, probably *Plectopylis*, as *Ophiogyra* is an American group. There is also said to be a *Hadra*, rather doubtful, this being rather an Australian group. *Streptaxis* is numerously represented (8 species); also *Amphidromus* (11). Of *Clausilia* only 3 species are as yet known, but 1 is the magnificent *C. Mouhoti*. In the operculate shells the most remarkable are *Myxostoma breve*, from Poulo Condor Island, and *Helicina* or *Trochatella Mouhoti*.

4. The Andaman and Nicobar Islands. These islands are very similar in their fauna, and both archipelagoes are related to the Indo-Malayan Province. *Naninæ* are numerous, including, in the Nicobars, the peculiar subgenus *Sagdinella*. *Streptaxis* and *Amphidromus* are represented, but by few species. In the Andamans there are 2 fine species of *Spiraxis*? One *Clausilia* has been described from the Nicobars. The operculate shells are numerous, comprising the genera *Cyathopoma* (Andamans), *Cyclotus*

(Nicobars), *Alycaeus* (A. & N.), *Cyclophorus* (A. & N.), *Leptopoma* (N.), *Cataulus* (N.), *Pupina* (N.), *Realia* (A.), *Helicina* (A. & N.) The *Cyclophori* include the curious lamellated *C. foliaceus*. The *Helicine* (*H. Andamanica*, *Nicobarica*, etc.), are elegant shells.

5. **China with Formosa.** The interior of China is very imperfectly known, and it would be premature to attempt to fix the exact boundaries between this and other regions. To the north there is evidently an intermixture of Palæarctic forms, and the same thing would appear to be the case on the south-east, the enormous altitude of that part of Central Asia having caused the northern fauna to spread and excluded tropical forms. The most striking peculiarity of the Chinese fauna is the abundance of sinistral *Helices*, *H. cicatricosa*, *Christinae*, etc. *Naninae* are comparatively few, whilst true *Helices* are numerous, especially of the subgenera *Camena*, *Plectotropis* and *Fruticicola*. *Coriila* has 1 species, *Obba* 1, *Acusta* 2, *Hadra* 3. *Streptaxis* is represented by 2 species. *Stenogyra* and *Clausilia* are both numerous. On the other hand, the operculate shells begin to diminish in numbers, as is always the case as we go towards the north. The following genera exist: *Cyclotus* 2, *Pterocyclos* 2, *Alycaeus* 2, *Paxillus* 1, *Cyclophorus* 3, *Otopoma* 1, *Realia* 1, *Cecina* 1, *Helicina* 1; but almost all these are from the South of China, except the genus *Cecina*.

THE ISLAND OF FORMOSA has been tolerably well explored, chiefly by Mr. Swinhoe. It is principally remarkable for a *Bulinus* of very peculiar form, *B. sphaeroconus*, and for some fine species of *Clausilia*—*Swinhoei*, *exilis*, etc.

A good account of the Chinese land shells (then known) will be found in Martens' "Preussische Expedition nach Ostasien."

The Thibetan shells seem to be largely of Palæarctic forms, the *Helices* are mostly of the s.g. *Fruticicola*, and there are no less

than 7 sp. of *Buliminus*. We owe our knowledge of these shells almost entirely to the Abbé David and the late Prof. Deshayes, the former having collected, and the latter described them.

6. Japan. The Japanese Islands were, till a few years ago, almost completely *terra incognita*, but since the opening of the ports to Europeans, and especially since travelling in the interior has been possible to some extent, our knowledge of the Japanese fauna has rapidly increased, and we find that it is equally remarkable for the number and for the beauty of the forms. A. Adams and V. Martens have both collected and described Japanese land shells. The descriptions of the former naturalist are unfortunately scattered through the Zoological Proceedings, a work which, while it may be described as a mine of wealth for conchologists, unfortunately justifies the analogy to a mine still further by the conchological papers, the ore, so to speak, being imbedded in a vastly preponderating mass of articles not bearing on the mollusca, which may properly be compared with the quartz or other matrix. V. Martens' "Preussische Expedition, etc.," on the other hand, gives a complete account of the Japanese land shells up to the date of publication, but, unfortunately that is several years back, and since then Dr. Kobelt has described many new species collected by Rein. There are several species of *Hyalina* and *Fruticicola*, a trace that northern influences are beginning to appear, though the general character of the fauna is clearly Palæotropical. *Nanina* is represented by few species. The characteristic subgenera of *Helix* are *Camena* 17 and *Plectotropis* 8 species. There are 2 species of *Hadra*, 2 of *Ægista*, and 1 of *Dorcasia*. The *Bulimini* are very few (2 only). *Balea* has 1 species and *Clausilia*, as already stated, is represented by numerous and handsome forms (20 species). It is especially the operculate fauna that proves the Palæotropical character of this province. The following are catalogued by Pfeiffer: *Cyclotus* 3, *Cælopoma* 1, *Alycæus* 2, *Cyclophorus* 2, *Pupina* 1, *Pupinella* 1, *Helicina* 2, *Realia* 3.

7. **Philippines.** These islands contain the finest assemblage of land shells to be found anywhere, whether regard be had to the number of species or to the beauty of the shells. In consequence of Cuming's explorations, they have been known for a longer period than most other extra-European localities, but still Semper and others have been able to make considerable additions to the list. It is a pity that no good general work on the Philippine land shells exists; Semper's is chiefly anatomical. The most striking characteristic of this fauna is the genus *Cochlostyla*, which is here represented by 172 species. These shells were formerly included in *Helix* and *Buimus*, but the fact that several were sometimes placed in the one and sometimes the other genus, seemed to indicate that a new grouping was required, and now the genus *Cochlostyla*, chiefly distinguished by the hydrophanous epidermis, is pretty generally recognized. 21 species of *Vitrina* are attributed to these Islands; they almost all probably belong to *Helicarion*. *Naninae* are numerous, including some very large species of the subgenera *Rhysota* and *Hemiplecta*, especially *N. ovum* and *maxima*. The genus *Trochomorpha* now becomes abundant (14 species). The *Helices* are tolerably numerous, and include some subgenera that we have not before met with, and that are characteristic of the Eastern Islands, e.g., *Chloræa* 8, *Obba* 15, *Chloritis* 2, *Planispira* 1, *Axina* 9. The subgenus *Corasia* (21 species), including many beautiful species, as *regina*, *virgo*, *puella*, etc., is by some included in *Helix* and by some in *Cochlostyla*. 14 species are referred to *Hadra*. *Amphidromus* exists, but there are only 2 species. One shell has been referred to *Endodonta*, an Australasian, and 1 to *Stylodon*, a Mauritian genus. The shell formerly called *Cylindrella Cumingiana* is now considered by Dr. Dohrn to be an *Ennea*.

We may mention that we had not seen his paper in the *Malak. Blaetter* when we wrote a short article on *Cylindrella* for the "Quarterly Journal of Conchology." In that article, how-

ever, we expressed doubts as to the generic position of *C. Cumingiana*. Not possessing the species in our collection, we could not pretend to decide on its true genus.

Stenogyra is numerous (10 species). The operculate shells chiefly belong to the genera *Cyclophorus*, of which there are 16 handsome species, though scarcely so fine as those of Burmah, and *Leptopoma* 22, *Cyclotus* has 7 species, *Alycæus* 1, *Arinia* 1, *Megalomastoma* 1, *Pupinella* 2, *Pupina* 7, and *Helicina* 9 species. We may remark the greater numbers of *Pupina* and *Helicina*, together with the reduction of the tubiferous genera to a single *Alycæus*, as indicating the passage to the Australasian fauna.

8. **Borneo** is still very imperfectly explored. The largest collections have been made in the Island of Labuan, and in Sarawak. The *Naninæ* are numerous and fine, especially the splendid reversed shell *N. Brookei*. Amongst the *Helices*, *nasuta* may be mentioned as a most remarkable form; there are, however, few true *Helices* known as yet from Borneo, and *Cochlostyla* is only represented by 1, and *Amphidromus* by 2 species. There is 1 *Electra*, and 2 *Clausiliæ* are found. The operculate fauna is interesting. There is 1 species of the curious genus *Opisthostoma*, in which the last whorl turns up in the form of a tube in a most extraordinary fashion (*O. Crespigny*). There are said to be 3 species of *Paxillus* but their specific distinction is rather doubtful. The other operculate genera are *Cyclotus* 2, *Opisthoporus* 3, *Iteocyclus* 5, *Alycæus* 3, *Diplommatina* 1, *Cyclophorus* 5, *Leptopoma* 6, *Megalomastoma* 3, *Rhaphaulus* 2, *Pupinella* 1, *Realia* 5, *Helicina* 2. The most complete account of the Bornean land shells is Prof. Issel's "Molluschi Borneensi"; Borneo, however, together with all the Dutch Islands is also treated of at length in V. Martens' "Pische Expedition."

9. **Sumatra to Bali.** The chain including Sumatra, Java, Bali, and the neighbouring small islands may be considered as a distinct

region, though it must be confessed that there does not seem to be in the mollusca that sharp distinction between the Philippines, Borneo, and Sumatra-Bali on the one side, and Celebes and the Moluccas, and Lombock-Timor on the other, that has been observed in other departments of Zoology. The leading Molluscan features of the Australasian Province do not appear, as we shall see, till much further to the East, whilst *Nesta*, *Hemiplecta*, *Amphidromus*, and other Indo-Malayan groups are found in Lombock, Timor, Celebes and the Moluccas. This chain of islands is not so rich as might be expected. The land shells of the comparatively small island of N. Caledonia are far more numerous than those of all this group. The fauna of Java was described many years ago by Mousson, the most recent account of the land shells of these islands is in Martens' work above referred to. Large *Nanina* are numerous, generally of obscure colors. Of *Helices* there are few, 5 are referred to *Fruticicola*, 6 to *Plectotropis*, and only 1 to *Geotrochus*. *Amphidromus* has 8 species, *Cochlostyla* 1. There is also 1 *Buliminus*. *Stenogyra* is represented by 6 and *Clausilia* by no less than 9 species. The operculate genera are *Cyclotus* 1, *Pterocyclos* 1, *Alycaeus* 3, *Cyclophorus* 8, *Opisthopoma* 3, *Leptopoma* 5, *Pupina* 2, *Helicina* 2.

V. **Australasian Province.** It is rather in accordance with the views of Lyell and Wallace than with our own convictions to make this Province begin here; we would have preferred to include the islands from Lombock to Timor, Celebes, the Moluccas, and New Guinea in the Palæotropical Province as the leading peculiarities of the Province are not found to any extent till we get to the eastward of those islands. We also consider it doubtful how far Australia, New Zealand, and the Polynesian Islands can be considered to belong to the same Province. We divide the Province into 5 great Regions, viz. :—

1. The Moluccan.
2. The West Polynesian.

3. The East Polynesian.
4. The Sandwich Islands.
5. The Australian.

1. The Moluccan Region includes those groups of which we have already spoken as more Palæotropical than Australasian. Large *Nanina*, generally of brighter colors than those of Java and Sumatra, abound, whilst the small species so characteristic of Polynesia are comparatively few. The Malayan subgenera of *Helix*, *Planispira Chloritis*, *Corasia*, etc., are numerous represented. *Amphidromus* has been found everywhere except in New Guinea. *Partula* has only 1 species, and that in New Guinea. Several genera of operculates continue that are altogether lost in Polynesia. *Leptopoma* and *Pupina* are abundant. *Placostylus*, that distinctive genus of West Polynesia, has not a single species. The examination of the separate groups will show this more distinctly.

A. *Lombok to Timor*. The following are the land shells:—
Nanina s.g. *Hemiplecta* 3, *Xesta* 2; *Trochomorpha* 1; *Helix* s.g. *Plectotropis* 1, *Dorcaia* 1, *Fruticicola* 1, *Rhagada* 1, *Planispira* 1; *Amphidromus* 5, *Buliminus* 3, *Cyclotus* 1, *Leptopoma* 1, *Helicina* 2. It will thus be seen that except by the deficiency of some genera, naturally to be expected in small islands, this is almost identical in genera with the fauna of Sumatra-Bali.

B. *Celebes*. This island has not been fully explored, the northern and southern extremities are better known than the intermediate portions. Pfeiffer records *Nanina* (*Xesta* 6, *Hemiplecta* 3, *Macrochlamys* 1, *Medyla* 1, doubtful 1), *Trochomorpha* 1, *Helix* (*Obba* 4, *Chloritis* 3, *Planispira* 1, *Fruticicola* 1), *Amphidromus* 1, *Buliminus* 1, *Cyclotus* 3, *Alyæus* 1, *Cyclophorus* 1, *Leptopoma* 3, *Pupinella* 1, *Pupina* 1, *Realia* 1, *Helicina* 1. We see the nearer relation to the Philippine and Bornean fauna in the greater number and variety of the operculate shells.

C. *Moluccas*. We have here a somewhat different fauna. Its great peculiarity is the abundance of the s.g. *Planispira* (no less than 29 species). *Chloritis* is also numerous (13 species), and *Phania* (3 species) is peculiar. There are two species of the Philippine genus *Cochlostyla*, and we find here the last species of *Clausilia* that we shall meet with in the Old World, one proof the more of the Paæotropical affinities of the fauna. The other groups are much the same as in Celebes.

D. *New Guinea*, including the Aroo Islands, Louisiade, &c. We here, for the first time, meet with an indication of Polynesian affinities in the presence of a single species of *Partula* and in the abundance of *Geotrochus* (19 species). A *Pedinogyra* indicates the proximity to Australia. A *Merope* is peculiar. The only operculates are *Cyclotus* 2, *Leptopoma* 5, *Pupinella* 4, *Helicina* 7. It must however be added that our knowledge of the zoology of New Guinea is very scanty, and that of the eastern part almost *nil*; and, judging from the ill success of recent attempts at settlement, we shall probably have to wait some time for a complete investigation of the island. Whether the result will be as disappointing as in Java and Sumatra, or whether New Guinea will be found to share in the conchological riches of the Solomon Islands remains to be seen.

2. **The West Polynesian Region.** We make this Region conterminous with the distribution of *Placostylus*. It consists of the Solomon Islands, New Caledonia, the Fijis, and the New Hebrides; the last named islands forming a transition to the East Polynesian Region.

A. *the Solomon Islands*. These are exceedingly rich; especially in the s.g. *Geotrochus*, of which there are 55 species of great beauty. The *Placostyla* are of more aberrant sections, 13 species. *Partula*, a genus special to the Polynesian Islands has 11 species. *Trochomorpha* also is now richly represented (15). Some of the Malaisian

subgenera of *Helix* and *Nanina* are still represented but in reduced numbers, e.g., *Xesta* 1, *Hemiplecta* 3, *Chloritis* 3. On the other hand, *Corasia*, a Philippine s.g., has 8 species. The operculate shells are not very numerous, and all the genera of Indian affinities have now disappeared, and *Leptopoma* 5, *Pupina* 4, and *Helicina* 7 species, are fully characteristic of an Australasian fauna. The presence of an *Otopoma* and of 2 species of *Cyclostomus* is curious. The former of these genera is distinctly African, and the latter, though more widely distributed, is very rare in Polynesia.

B. *New Caledonia*. The New Caledonian Archipelago has been very fully explored by the French officials and missionaries, and their discoveries have been described by M.M. Crosse, Gassies, and Souverbie. M. Gassies has published a monograph of the land and freshwater shells of New Caledonia. The types mostly exist in the Museum of Bordeaux, which is probably richer than any other in New Caledonian shells. The leading characteristics of the fauna are (1) The abundance of large, heavy species of *Placostylus* of the typical section, such as *P. fibratus*, *Souvillei*, &c. Of these 25 species are given by Pfeiffer; some of them may possibly turn out to be varieties, but in any case they are numerous; (2) Small *Helices*, generally strongly sculptured, and *Patulæ*, 55 species. The uniformly small size of the *Helices* is a remarkable feature of the fauna. *H. Saisseti* is perhaps the largest—a giant compared with most of the others, and elsewhere it would not be considered a conspicuous shell; (3) The curious genus *Dipiomphalus*, of a planorbiform shape. These shells, *D. Mariei*, *Megei*, etc., were formerly included in *Helix*, but M. Crosse has shown that the animals are carnivorous, and that the mollusks consequently belong to the *Testacellidæ*; (4) The abundance of *Rhytida* (10 species). This genus, of ordinary heliciform shape, is also carnivorous. The *Patulæ*, with internal teeth or lamellæ (*Endodonta*, *Pityis*) so abundant in Eastern Polynesia, have only 3 species here. There are 7 species of *Pupa*, including one or two

reversed ones. *Tornatellina* appears with 2 species. *Helicina* becomes abundant, a true Polynesian feature (14 species). The other operculates are few. *Diplommatina* 3, *Cyclophorus* 6, *Pupina* 1, *Realia* 9. There is not a single species of *Partula*.

C. *Fiji Islands*. Though these Islands have been explored by Dr. Graeffe, it is probable that much more will be found there. Mousson has published the fauna in "The Journal de Conchyliologie." The small zonitiform shells, doubtfully referred to *Nanina*, now begin to appear. The *Placostyli* are of the section *Charis*, such as *P. Strangei*, and of another type, including *Koroensis*, *Seemanni*, etc., of a narrower, heavier form, more like the New Caledonian shells. There are 14 *Placostyli* altogether. *Amphidromus* has 2 species, and *Partula* likewise 2. That these genera, one distinctly Hindo-Malayan and the other as distinctly Polynesian, should both be equally represented is strange. Probably further research will prove one or the other to be predominant. *Tornatellina*, a genus widely distributed in Polynesia, has 2 species. *Diplommatina*, which after a temporary disappearance in the Malay Islands reappears in Polynesia, has 7, and the allied *Moussonina* 1 species. *Realia* is more abundant in Polynesia than elsewhere; in Fiji there are 10 species.

D. *New Hebrides*. These islands seem to partake of various characteristics. Whilst 2 species of *Placostylus* and 4 of *Geotrochus* indicate a West Polynesian fauna, and 2 of *Amphidromus* even a Malayan, 6 species of *Partula* point more to East Polynesian affinities. These islands have evidently been very imperfectly explored, as besides the genera named, only the following have as yet been found: *Helix* 1, *Trochomorpha* 1, *Patula* 1, *Buliminus* 1, *Cyclotus* 2, *Diplommatina* 2, *Cyclophorus* 3, *Pupina* 2, *Realia* 2, *Helicina* 6.

3. **East Polynesian Region.** We include in this the remainder of the Polynesian Islands, except the Sandwich Islands, which

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form a region apart. We here find a comparatively extensive fauna considering the small size of most of the islands, but an absence of any conspicuous shells.

The *Helicidæ*, like those of New Caledonia, are very small, the sections with internal lamellæ being however numerous here. *Placostylus* and *Amphidromus* have both disappeared. The large *Naninæ* are no longer met with, and we have finally taken leave of the fine Indo-Malayan genera of *Cyclostomidæ*. On the other hand, *Partula* becomes very numerous, and with *Trochomorpha* furnishes the only shells even approaching to a moderate size. *Tornatellina* has a good many species, and amongst the operculates there are various forms of *Diplommatinidæ* (*Palaina*, *Moussonia*, etc.), of *Cyclophoridæ* (*Ostodes*) and many species of *Realia*, all small shells.

A. *Samoa Islands*. These and the Tonga Islands have, like the Fijis, been explored by Dr. Graeffe, and the results, as far as the land and freshwater shells are concerned, have been published by Prof. Mousson in the "Journal de Conchyliologie." From the smaller size and lesser number of the Islands, it is probable that Dr. Graeffe has been able to approach much nearer to discovering the complete fauna than in the case of the Fijis. One species has been referred to *Amphibulima*, rather doubtful. There is also *Microcystis*, etc., 8, *Partula* 2, *Pityis* 3, *Trochomorpha* 6, *Stenogyra* 1, *Partula* 13, *Tornatellina* 2, *Cyclotus* 1, *Moussonia* 1, *Ostodes* 6, *Realia* 7, *Helicina* 3.

B. *Tonga Islands*. The genera and many of the species are the same as those of Samoa. It is remarkable that only one species of *Partula* has been found.

C. *Cook's Islands*. Here 3 species of *Diadema*, one each of *Chondrella*, *Palaina* and *Cyclomorpha* are remarkable. There are 16 species of *Pityis*. The other genera are but poorly represented. *Microcystis* 1, *Trochomorpha* 3, *Partula* 1, *Tornatellina* 1, *Pupa* 1, *Helicina* 1, *Cyclophorus* 1, *Realia* 4.

D. *Society Islands*. These have been very well explored by Pease and others, and probably we are now acquainted with the greater part of their land shells. The genus *Partula* here attains its maximum, no fewer than 42 species being recorded. It is, however, probable that some of these will not stand. *Succinea* abounds (11 species). Of *Patula* there are 8 and of *Endodonta* 6 species. There are several small *Zonitida*. The operculate shells almost all belong to *Realia* (14) and *Helicina* (12). The only other operculates are one species each of *Cyclophorus* and *Chondrella*.

E. *Austral Islands, including Opara*. The most striking peculiarity of these islands is the occurrence of a species of *Stoastoma*, a genus otherwise exclusively West Indian. The other land shells belong to groups common in the neighbouring islands, and include 6 species of *Endodonta* and 5 of *Tornatellina*.

F. *Low Islands*. We now come to the extreme eastern part of the Polynesian Archipelago, where the fauna is the poorest. Only 20 species have been recorded from these islands, of which five belong to *Microcystis* and five to *Helicina*. *Endodonta* and *Realia* have each 2, and *Pitys*, *Partula*, *Pupa*, *Cyclophorus*, *Cyclomorpha* and *Chondrella* 1 species.

G. *Marquesas*. We now begin to work our way back by the north. In the Marquesas we have the usual Polynesian fauna, of about 24 species, *Pitys*, *Partula*, *Tornatellina*, *Realia*, *Helicina*, etc. The only peculiarity is the existence of 2 species of *Vitrina*.

H. *Phœnix, Ellice, Kingsmill, and Marshall Islands*. These are chiefly coral islets and have yielded very little. The genera are *Nanina* 2, *Patula* 1, *Pitys* 1, *Stenogyra* 1, *Tornatellina* 1, *Pupa* 1, *Realia* 3, *Helicina* 2.

I. *Caroline Islands*. Returning to the westward we find a somewhat richer fauna. One species each of *Rhysota* and *Pupina*

indicate the proximity of the Malayan Islands. *Trochomorpha* is well represented (7 species). The other shells are *Partula* 3, *Tornatellina* 2, *Pupa* 1, *Cyclophorus* 1, *Cyclostomus* 1, *Realia* 2, *Helicina* 2.

J. *Pelew Islands*. These are very remarkable for the existence of a peculiar genus of *Diplommatinacea*, of which only one or two species occur elsewhere, whilst there are 15 in the Pelew Islands, and hence it has been named *Palaina* by Semper. There are 2 species of *Pupina* and even 1 of *Chloræa*. *Partula* has 3 species.

LADRONES. From these small islands the following only are known: *Succinea* 1, *Microcystis* 2, *Helix* 1, *Partula* 6, *Realia* 2.

4. *Sandwich Island Region*. We consider the Sandwich Islands, from their peculiar fauna, as entitled to rank as a distinct region from the rest of Polynesia, from which they are also geographically remote. They have, it is true, certain Polynesian features. *Endodonta* and *Pitys* have many species (14), and *Partula* exists, but only represented by two species. There are also several of the zonitiform *Nanina*, but the following peculiarities are, we think, sufficient to constitute a distinct region: (1) The genus *Achatinella*. Of this genus 291 species have been described, all from the Sandwich Islands. Probably many so called species will turn out to be synonyms or varieties, but even a reduction of a third or a half would leave a very large number. From the anatomical investigations of Messrs. Binney and Bland, it is probable that *Achatinella* will have to be split up into two or three genera, and we are therefore disposed to admit the subfamily *Achatinellina* proposed by Messrs. Gulick and Smith, and this subfamily is exclusively from the Sandwich Islands. (2) The genus *Auriculella*, of which 19 species have been proposed, all from these islands. Included in *Achatinella* till lately, this genus is now admitted by Pfeiffer as distinct. (3) The genus *Carelia*. These are long turreted shells with a peculiarly twisted

columella, their true position is somewhat doubtful. Nine species have been described, all from the Sandwich Islands. (4) The genus or subgenus *Catinella* of Pease. These are *Succinea* of aberrant form. Pfeiffer only mentions 2 species.

The only other genera that are abundant in these Islands are *Succinea* 12, *Pupa* 9, and *Helicina* 8 species. One species has been referred to *Ferussacia*, a very doubtful identification, the shell is probably an *Achatinella*.

5. Australian Region. We include in this Region, Australia, Tasmania, New Zealand, and the following small islands: Norfolk Island, Kermadec, and the Auckland Islands.

True *Helices* exist in this region in large numbers, and of fine forms. Operculates are chiefly represented by *Pupina*, *Realia* and *Helicina*. *Partula* is altogether wanting. Taken on the whole the fauna has a much nearer resemblance to that of the Malay Archipelago than to the Polynesian.

A. Australia. The north-east coast is the richest part. Beyond the tropic land-shells are comparatively few, though some have been described even from the interior. Cox's Monograph of Australian Land Shells, published about ten years ago, gives a complete account of all those then known; others have since been described. *Vitrina*, or more probably *Helicarion*, is abundant (18 species). One species has been referred to *Simpulopsis*, though this is a very doubtful identification, *Simpulopsis* being an American genus. *Nanina* are comparatively few, 20 species. *Trochomorpha*, on the other hand, has 19 species. One species has been referred to the Madagascan s.g. *Ampelita*. The characteristic subgenera of *Helix* are *Xanthomelon* 8, *Galaxias* 13, *Pedinogyra* 2, *Hadra* 52, *Charopa* 6. There are 8 species of *Rhytida*, a genus of which we have spoken under New Caledonia. *Dorcasia* has 4 species, *Camena* 5, and *Planispira* 4; all showing a Malayan affinity. *Plectrotrypis*, an Asiatic genus, is represented by one species. Six species have

been referred to *Cochlostyla*, which may be correct, but we rather doubt the three so-called *Vallonix*. *Buliminus* is very rich, 26 species. The operculates are *Blanfordia* 1, *Diplommatina* 2, *Cyclophorus* 3, *Pupinella* 4, *Pupina* 11, *Realia* 1, *Helicina* 10, and, strange to say, if the identification be correct, one species of the Indian genus *Georissa*.

B. *Tasmania*. Numerous species of *Trochomorpha* (about 20) and the peculiar subgenus of *Helix*, *Anaglypta*, of which, however, only one species is known, *H. Launcestonensis*, form the most striking features. There are 3 species of *Rhytida*, 8 of *Charopa*, and, curiously enough, 5 of *Pitys*.

C. *Norfolk Island* has only *Nanina* 2, *Trochomorpha* 1, *Patula* 3, *Palaina* 1, *Realia* 2, *Helicina* 1.

D. *Kermadec* only possesses *Vitrina* 1, *Macrochlamys* 1, *Thalassia* 1, *Patula* 1. We may remark with reference to the *Vitrina* that Mr. Edgar Smith's name *Kermadecensis* has priority over Prof. Mousson's *ultima*. They were published in the "Annals and Magazine of N.H." and "The Journal de Conchyliologie" of the same nominal date, but whereas the "Journal" rarely appears till from six weeks to two months after date, the English Magazines are always published a few days *before* date. Both Mr. Smith and Prof. Mousson could very well afford to dispense with whatever honor may be considered to arise from having their names attached to this shell, we have, therefore, no hesitation in pointing out what we believe to be the correct state of the case.

E. *New Zealand* has hardly answered to the expectations formed of it. Woodward says that it is "rich in land shells." If so, it is strange that scarcely half as many species have been found as in New Caledonia. *Naninae* are tolerably numerous, *Paryphanta* 16, *Thalassia* 7. There are 20 species of *Charopa*, which may be considered as the characteristic group. Two species

have been referred to *Rhytida*, 1 to *Laoma*, and 1 to *Dorcasia*. The most interesting feature in the fauna is perhaps the presence of 2 species of *Placostylus*, of the typical New Caledonian section. There is also 1 *Balea*. The operculates are very few, *Diplomma-tina* 1, *Realia* 6, and *Cyclophorus* 2.

F. *Auckland Islands* possess only *Vitrina* 1 and *Thalassia* 2.

We have now concluded our survey of the geographical distribution of the Mollusca of the Old World, and pause for the moment. Should this effort be favorably received, it is our intention, after a short delay, to complete our task by a similar sketch of the general features of American Molluscan life. We are aware that there must be many deficiencies and errors in any such attempt, and shall always feel grateful for any information that may enable us to issue supplementary notes making good such deficiencies or correcting such errors. We will only add, in concluding this first part, that we have intentionally limited it to that portion of the extra-marine mollusca to which we have more specially attended; and we are quite conscious that, to complete the subject, the naked molluscs and the fresh-water species should likewise be included. The latter we may undertake some time; as to the slugs we confess we share in Dr. Jeffreys' aversion for them.

NOTE.—It may be proper to add, that the portion of this paper referring to the Palæarctic Province was written before the publication of Dr. Kobelt's second supplement to his catalogue. Fully recognizing the importance of the views he has therein expressed, we have thought that it would be more satisfactory to both for our paper to be published as it was originally written, and we have consequently made no alteration in it.

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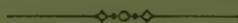
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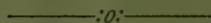
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