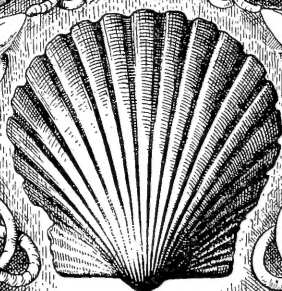


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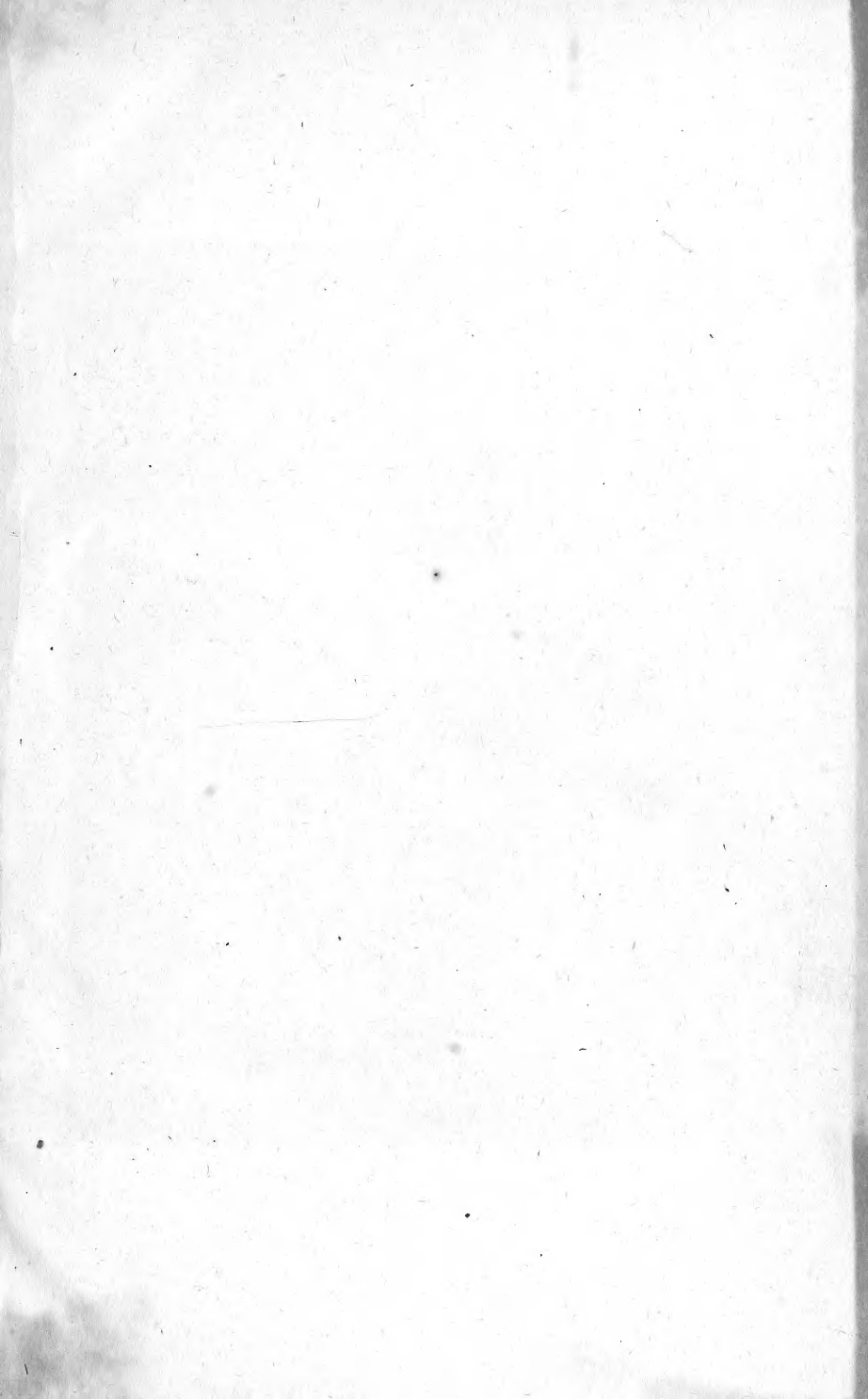


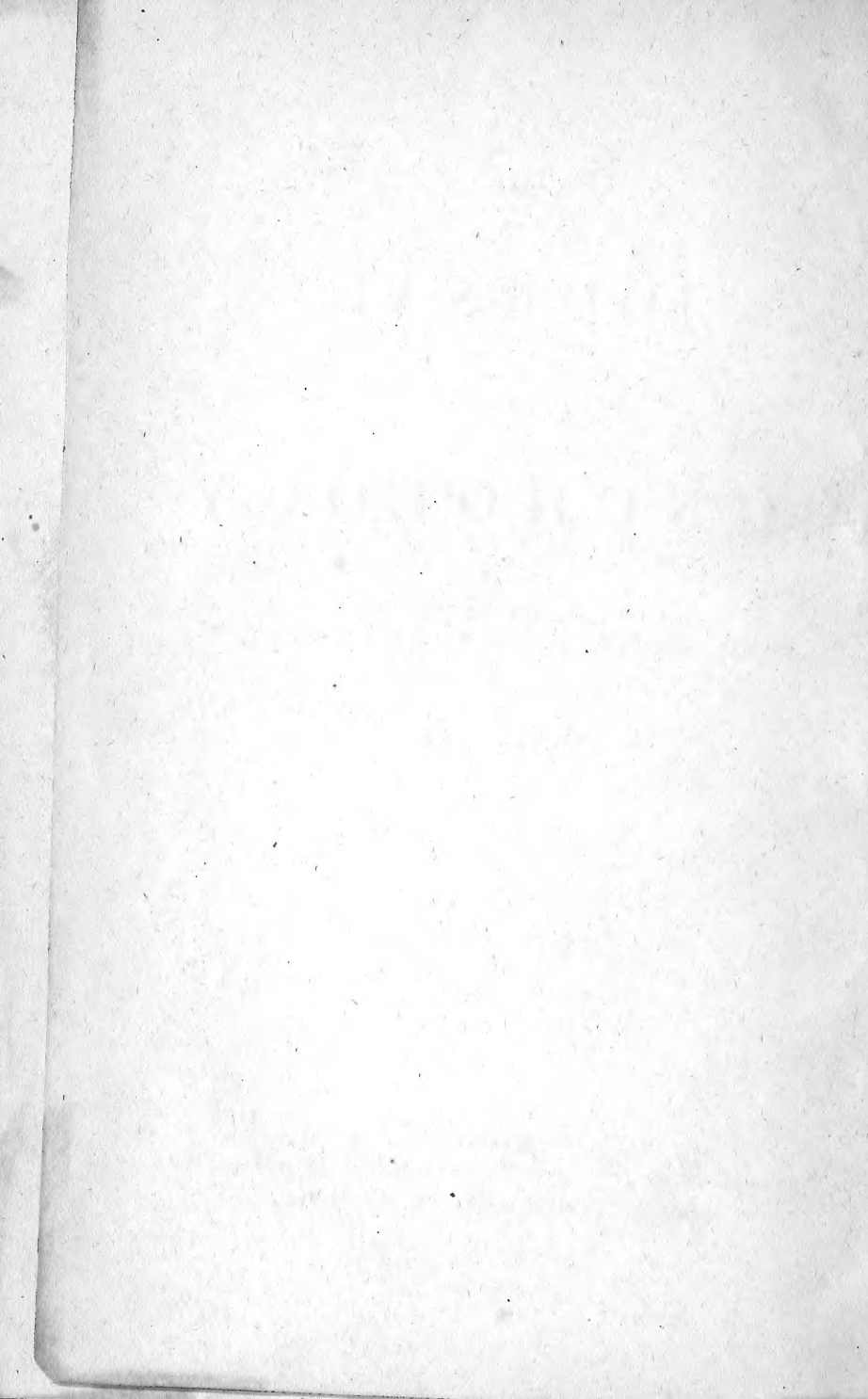
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THE
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CATALOGUE OF THE POLYNESIAN *MITRIDÆ*, WITH
REMARKS ON THEIR GEOGRAPHICAL RANGE, STA-
TION, AND DESCRIPTIONS OF SUPPOSED NEW
SPECIES.

BY ANDREW GARRETT.

The family *Mitridæ*, which includes some of the most beautiful shells as regards elegance of form, sculpture and color, is represented in Polynesia by nearly 200 species, many of which are very rare.

They inhabit various stations; many being strictly reef shells, where they lurk in holes and crevices under sea-weed, but are most generally concealed under stones and blocks of dead coral. Others burrow in sand or sandy-mud at various depths; some delight in stony ground inside the reefs, where they remain concealed under clumps of coral during the day, and like the sand species are nocturnal in their habits. All the species belonging to the section or subgenus *Zierlina* are found beneath

water-worn stones in the middle region of the littoral zone, on rocky coasts usually associated with *Neritæ*.

Every species enumerated in the following list were collected by the writer, so that the habitats, station and geographical range may be relied on as trustworthy.

Further exploration will I am sure add many more species to the list and modify the geographical range of others.

In addition to the 167 species collected by myself, I have added 29 species on the authority of other authors.

The Polynesian shells which have been described under the name of *Thala*, a subgenus of *Mitridæ*, are much more nearly related to *Pleurotomidæ* than with the former family, and with the exception of *Thala alba* and *T. saltata*, which are true *Mitræ*, I have excluded the others from this catalogue.

The structure of the folds or wrinkles on the columella are not true plaits, but simply more or less irregular transverse rugosities precisely of the same structure as observed in certain species of *Clathurella* and *Cithara*.

In fact the earliest known species was described by Dr. Mighels, under the name of *Pleurotoma todilla*. Mr. Reeve in his Monograph of *Mangelia* has described a Philippine species under the name of *Mangelia solida*. The latter is exactly the same shape, and the granulate sculpture, linear aperture and the columellar wrinkles do not differ from Polynesian species.

The above two species, together with *Thala anglostoma* Pease, and *T. exquisita* and *violacea* Garr., should be embraced in a new genus and removed to the family *Pleurotomidæ*.

I also exclude from the *Mitridæ* Mr. Pease's genus *Mitropsis*, which undoubtedly belongs to the family *Columbellidæ*.

[illegible]

			W. Polynesia.					E. Polynesia.				
			Viti Islands.	Tonga Islands.	Samoa Islands.	Kingsmill Isles.	Caroline Isles.	Cook's Islands.	Society Islands.	Panmotu Islands.	Marquesas Isles.	Sandwich Isles.
34	Mitra	lugubris Swains.	...	x	x	x	x	x	x	x		x
35	"	mariculata Lam.	...	x								
36	"	micans Reeve	...					x				
37	"	nevia Swains.	...					x		x		
38	"	nexilis Mart.	...	x	x	x	x	x	x	x		x
39	"	nebulosa Swains.	...	x	x							
40	"	oleacea Reeve	...	x		x			x			
41	"	propinqua Garr.	...						x			
42	"	peculiaris Reeve	...	x								
43	"	pontificalis Lam.	...	x	x	x	x	x	x	x	x	x
44	"	peregra Reeve	...	x	x	x	x		x	x		x
45	"	pellis-serpentis Reeve	...				x	x	x	x		x
46	"	papalis L.	...				x	x				
47	"	procissa Reeve	...	x	x	x						
48	"	robusta Reeve	...	x		x						
49	"	rubritincta Reeve	...	x		x						
50	"	retusa Lam.	...	x	x	x	x					
51	"	subtexturata Garr.	...						x			
52	"	serpentina Lam.	...	x						x		
53	"	sphaerulata Mart.	...	x	x	x	x	x	x	x		x
54	"	spiripuncta Garr.	...	x								
55	"	scabriuscula L.	...	x					x	x		
56	"	typha Reeve	...	x								
57	"	tabanula Lam.	...	x								
58	"	testacea Swains.	...			x		x	x	x		
59	"	tessellata Mart.	...			x			x	x		
60	"	texturata Lam.	...	x								
61	"	tuberosa Reeve	...	x	x	x	x	x	x	x		x
62	"	turgida Reeve	...	x	x	x	x		x	x		x
63	"	Ticaonica Reeve	...	x					x			
64	"	telescopium Reeve	...	x								
65	"	Tahitensis Garr.	...						x			
66	"	ustulata Reeve	...	x								

		W. Polynesia.					E. Polynesia.				
		Viti Islands.	Tonga Islands.	Samoa Islands.	Kingsmill Isles.	Caroline Isles.	Cook's Islands.	Society Islands.	Panmotu Islands.	Marquesas Isles.	Sandwich Isles.
67	<i>Mitra versicolor Mart.</i> ...	x	x								
68	" sp. ...	x									
69	" sp. ...			x							
70	" sp. ...	x									
71	" sp. ...			x							
72	<i>Strigatella acuminata Swains.</i>	x	x	x	x	x	x	x		x	x
73	" <i>auriculoides Reeve</i> ...	x	x	x	x	x	x	x		x	x
74	" <i>brunnea Pease</i> ...	x		x		x	x	x			x
75	" <i>columbellæformis Kien.</i>				x		x	x			
76	" <i>litterata Lam.</i> ..	x	x	x	x	x	x	x			x
77	" <i>maculosa Reeve</i> ..	x	x	x	x	x	x	x			x
78	" <i>paupercula L.</i> ...	x	x	x	x	x					
79	" <i>virgata Reeve</i> ...	x	x	x	x	x					
80	" <i>zebra Garr.</i> ...	x		x							
81	<i>Turricula amabilis Reeve</i> ...	x	x	x	x		x	x	x		
82	" <i>aurantia Swains.</i> ...								x		
83	" <i>amanda Reeve</i> ...	x									
84	" <i>assimilis Garr.</i> ...	x		x			x				
85	" <i>angulosa? Mart.</i> ...	x									
86	" <i>bilineata Reeve</i> ...	x									
87	" <i>bella Pease</i> ...										x
88	" <i>bicolor Garr.</i> ...			x					x		
89	" <i>Cumingii Reeve</i> ...			x					x		
90	" <i>cadaverosa Reeve</i> ...	x		x				x	x		
91	" <i>concinna Reeve</i> ...	x		x							
92	" <i>crocata Lam.</i> ...	x	x	x			x	x			
93	" <i>consanguinea Reeve</i> ...	x	x	x	x		x	x	x		
94	" <i>crebrilirata Reeve</i> ...	x									
95	" <i>concentrica Reeve</i> ...	x									
96	" <i>cruentata Chem.</i> ...	x									
97	" <i>cimelium Reeve</i> ...							x	x		
98	" <i>crispa Garr.</i> ...	x		x							
99	" <i>castanea Garr.</i> ...	x		x							

			W. Polynesia.					E. Polynesia.				
			Viti Islands.	Tonga Islands.	Samoa Islands.	Kingsmill Isles.	Caroline Isles.	Cook's Islands.	Society Islands.	Panmotu Islands.	Marquesas Isles.	Sandwich Isles.
100	<i>Turricula</i>	<i>diachroa</i> <i>Ads. & Reeve</i>	x	x	x							
101	"	<i>discoloria</i> <i>Reeve</i>	...	x								
102	"	<i>exasperata</i> <i>Chem</i> ...	x	x	x	x	x					
103	"	<i>exquisita</i> <i>Garr.</i>	...	x	x			x	x	x		
104	"	<i>Emiliæ</i> <i>Schmeltz</i> ...								x		
105	"	<i>flammulata</i> <i>Pease</i>	...	x	x			x	x	x		
106	"	<i>flexicostata</i> <i>Garr</i> ...	x	x						x		
107	"	<i>festiva</i> <i>Garr.</i>...	...	x								
108	"	<i>fusco-nigra</i> <i>Garr</i> ...	x									
109	"	<i>fortiplicata</i> <i>Pease</i>	...							x		
110	"	<i>Gruneri</i> <i>Reeve</i>	...		x							
111	"	<i>Hoyti</i> <i>Garr</i>...	...	x								
112	"	<i>instricta</i> <i>Garr</i>	...	x								
113	"	<i>lyrata</i> <i>Lam</i>...	...	x								
114	"	<i>luteo-fusca</i> <i>Garr</i> ...						x				
115	"	<i>luculenta</i> <i>Reeve</i>	...	x	x	x						
116	"	<i>leucodesma</i> <i>Reeve</i>		x								
117	"	<i>lauta</i> <i>Reeve</i>...	...	x	x	x	x	x	x	x		x
118	"	<i>laevicostata</i> <i>Garr</i> ...								x		
119	"	<i>microzonias</i> <i>Lam.</i>	...	x	x	x	x		x	x		
120	"	<i>mucro</i> <i>ata</i> <i>Swains.</i>							x	x		
121	"	<i>millicostata</i> <i>Swains.</i>	...							x		
122	"	<i>modesta</i> <i>Reeve</i>	...	x	x							
123	"	<i>multicostata</i> <i>Swains</i> ...	x		x			x	x	x		
124	"	<i>Michauii</i> <i>Cr. et Fisch.</i>	x	x								
125	"	<i>modicella</i> <i>Garr.</i>	...							x		
126	"	<i>nodosa</i> <i>Swains.</i>	...	x	x	x	x	x	x	x		x
127	"	<i>obeliscus</i> <i>Reeve</i>	...	x								
128	"	<i>purpurata</i> <i>Reeve</i> ...								x		
129	"	<i>patriarchalis</i> <i>Gmel.</i>	...	x	x							
130	"	<i>Pacifica</i> <i>Reeve</i>	...	x	x	x			x	x		
131	"	<i>plicata</i> <i>Klein</i>...	...				x					
132	"	<i>porphyretica</i> <i>Reeve?</i>	x		x							

			W. Polynesia.					E. Polynesia.				
			Viti Islands.	Tonga Islands.	Samoa Islands.	Kingsmill Isles.	Caroline Isles.	Cook's Islands.	Society Islands.	Panmotu Islands.	Marquesas Isles.	Sandwich Isles.
133	<i>Turricula pulchra</i>	<i>Garr.</i>	...	x		x						
134	"	<i>putillus</i> <i>Pease</i>	...						x	x		
135	"	<i>Peasei</i> <i>Garr.</i>	...	x								
136	"	<i>propinqua</i> <i>Garr.</i>	...	x								
137	"	<i>rosea</i> <i>Swains.</i>	...							x		
138	"	<i>rubra</i> <i>Swains.</i>	...							x		
139	"	<i>subulata</i> <i>Lam.</i>	...	x								
140	"	<i>semifasciata</i> <i>Lam.</i>	...	x	x	x						
141	"	<i>stigmataria</i> <i>Lam.</i>	...	x								
142	"	<i>speciosa</i> <i>Reeve</i>	...					x		x		
143	"	<i>tusa</i> <i>Reeve</i>	...			x			x	x		x
144	"	<i>unilineata</i> <i>Garr.</i>	...	x								
145	"	<i>vittata</i> <i>Swains.</i>	...	x								
146	"	<i>variata</i> <i>Reeve</i>	...	x		x		x	x	x		
147	"	<i>vulpecula</i> <i>L.</i>	...	x								
148	"	<i>Zebuensis</i> <i>Reeve?</i>	...	x								
149	"	<i>sp.</i>	...	x								
150	"	<i>sp.</i>	...							x		
151	"	<i>sp.</i>	...				x					
152	"	<i>sp.</i>	...							x		
153	"	<i>sp.</i>	...	x								
154	"	<i>sp.</i>	...	x								
155	"	<i>sp.</i>	...							x		
156	"	<i>sp.</i>	...	x								
157	<i>Cylindra nucea</i>	<i>Gron.</i>	...	x	x	x	x	x	x	x		x
158	"	<i>dactylus</i> <i>L.</i>	...	x	x	x	x	x	x	x		x
159	"	<i>crenulata</i> <i>Chem.</i>	...	x	x	x	x	x	x	x		x
160	"	<i>fenestrata</i> <i>Lam.</i>	...	x					x	x		
✓161	<i>Imbricaria Olivæformis</i>	<i>Swains.</i>	...	x		x	x	x	x	x		x
162	"	<i>conica</i> <i>Schum.</i>	...	x		x		x	x	x		
163	"	<i>punctata</i> <i>Swains.</i>	...	x	x	x		x	x	x		
164	"	<i>virgo</i> <i>Swains.</i>	...	x	x	x	x	x	x	x		x
165	"	<i>Vanicorensis</i> <i>Q. et G.</i>	...	x								

		W. Polynesia. E. Polynesia.									
		17 species	x	Viti Islands.							
166	<i>Mitroidea multiplicata</i> Pease ...	46 species				Tonga Islands.					
167	<i>Dibaphus Philippii</i> Crosse ...	73 species	x	x		Samoa Islands.					
		42 species				Kingsmill Isles.					
		36 species				Caroline Isles.					
		41 species	x	x		Cook's Islands.					
		64 species	x	x		Society Islands.					
		75 species	x	x		Panmotu Islands.					
		6 species				Marquesas Isles.					
		31 species	x	x		Sandwich Isles.					

132 species were found in Western Polynesia, 72 of which did not occur to our notice in Eastern Polynesia.

In Eastern Polynesia we obtained 96 species, 35 of which were not found in Western Polynesia.



Genus MITRA Lamarck.

1. **Mitra adusta** Martin. Reeve, Conch. Icon., pl. iv., fig. 25.

Excepting the Marquesas, we obtained this species in all parts of Polynesia, but comparatively rare in every group except the Viti Islands, where they occurred in abundance in a single location in the eastern portion of Vanua Levu. They were found congregating in numbers of all ages, beneath large masses of dead coral near low water mark.

Reeve's figure is much lighter colored than any South Sea examples, and has the appearance of a weathered shell.

2. **Mitra ambigua** Swainson. Reeve, l. c., pl. ii., fig. 8a, 8b.

Not uncommon under large blocks of coral near low water mark, Viti Islands; more rare at Samoa and very scarce at the Society and Panmotu Islands. Examples obtained at the two latter groups are less than an inch in length and have the subsutural band very clearly defined.

Viti specimens attain a length of two inches, which is smaller than Reeve's figure of a Philippine shell. Our shells are darker colored, more slender, and the aperture more contracted than the above mentioned figure.

3. **Mitra annulata** Reeve. l. c. pl. xiv. fig. 103.

A rare species, found burrowing in clear sand in the upper region of the laminarian zone, inside the reefs at the Society Islands.

Mr. Reeve who records it from Zanzibar, does not mention the color; and his figure which agrees very closely in shape and sculpture with our shells, is, like many of his figures carelessly colored.

Society Island examples are livid-white, sometimes stained with light ferruginous, and more or less mottled and

longitudinally striped with brown. Aperture white, with a slight orange-brown tinge deep in the throat.

The transverse ridges are rather sharp, their interspaces with or without the smaller ridges, and longitudinally with closely-set incised lines.

It is closely allied to, but quite distinct from *M. flammea* Quoy and Gaimard (not of Reeve), and *M. interlirata* Reeve.

Paetel records it from New Caledonia.

The animal is creamy white, profusely maculated with small irregular opaque-white spots, and the anterior portion of the foot, base of tentacles and siphon tinged with brown.

4. *Mitra astricta* Reeve, l. c., pl. xxiv., fig. 188.

This somewhat rare species only occurred to my notice at the Sandwich and Marquesas Islands, where they were found near low water mark on rocky coasts.

The color varies from light yellowish-brown to olive-brown, with or without the five transverse brown lines and subsutural pale band mentioned by Reeve. The surface is more or less striated parallel to the axis of the shell, and the upper whorls are finely granulated.

5. *Mitra amphorella* Lamarck. Reeve, l. c., pl. xii., 83a, 83b.

Not uncommon at the Viti, and very rare at the Panmotu Islands, where they were found beneath masses of dead coral on the shore or fringing reefs.

Viti examples which are larger than Panmotu specimens, differ considerably in the size of adults, which in shape are about intermediate between Reeve's two figures, which are colored precisely the same as our shells. The spiral incised lines or grooves are generally obsolete on the middle of the body whorl and are either simple or punctated.

It is frequently referred to the genus *Strigatella*; but as none of my examples exhibit the peculiar peristome of that

genus, I think its position should be in the subgenus *Nebularia*.

6. *Mitra ancillides* Swainson. Reeve, l. c., pl. xxxviii., fig. 319.

47 An exceedingly rare species of which I found two dead but perfect examples washed up on the outer beach at Anaa, one of the Paumotu Islands.

Mr. Swainson's type specimens were collected by Cuming in the same locality. My largest example is 20 mill. in length, and both are creamy-white with a very faint luteous tinge. The upper whorls are granulated and the columella six-plaited.

7. *Mitra aurora* Dohrn. Proc. Zool. Soc. 1861, p. 205, pl. xxvi., fig. 3.

27 This rare and beautiful species occurred to our notice at the Sandwich, Society, Cook's and Paumotu Islands, where they were all found washed up from deep water on the outer reefs. All my examples are in the condition of more or less perfect dead shells.

The colour, which varies from light orange to orange-red, is undoubtedly darker in the living shells, and is more or less freckled and striped with white.

The late Mr. Pease considered it a large variety of *Mitra coronata*. It appears to me, however, sufficiently distinct to rank as a separate species.

My largest examples which were found at Anaa, Paumotu Islands, are 45 mill. in length, which is nearly twice the size of Polynesian specimens of *coronata*. As compared with the latter, the whorls are not spirally ridged, the incised lines are finer, the punctures smaller, more crowded, and the columella has one more plait. 47

Polynesian examples of *coronata* are dark brown with a tawny-yellow subsutural band, and the whorls are encircled

with convex ridges. They also inhabit different stations and belong to different subgenera.

8. **Mitra anthracina** Reeve, Conch, Icon., pl. xviii., fig. 137.

This is also a very rare species of which I found two examples under stones, in the middle region of the littoral zone, at Taviuni, Viti Islands.

Our shells are a little smaller and the spire is more robust than represented in Reeve's figure.

9. **Mitra alba** Pease, *Thala alba*, Pease, Amer, Jour. Conch., 1867, p. 215, pl. xv., fig. 8.

A few examples of this small rare species were found in beach sand at the Paŋmotu and Society Islands.

Its small size, (8 mill.) uniform glossy white color and fine spiral impressed striæ will readily distinguish it.

Mr. Pease referred it to the genus *Thala*. It should I think be embraced in the subgenus *Mutya*.

10. **Mitra assimilis** Pease, l. c., 1867, p. 211, pl. xv., fig. 1.

Three dead specimens found beneath stones in the lower region of the littoral zone at the Marquesas group.

They agree in every particular with Mr. Pease's description and figure, except in being a little smaller and the pale subsutural band not so distinctly defined.

11. **Mitra abbatis** Chemnitz. Reeve, Conch. Icon., pl. xiii. fig. 91.

This, which is one of our rarest South Sea Mitres, has occurred to us only in the condition of beach shells, at Huahine, Society Islands.

Reeve's figure which represents a Philippine example, though one third larger than Polynesian, agrees in every other particular with our shells.

12. **Mitra brumalis** Reeve, l. c., pl. xxxiv., fig. 280.

Occurs beneath dead coral on reefs, and, excepting the

Marquesas, ranges throughout Polynesia. A large series of specimens connect it with *M. pellis-serpentis*, Reeve.

It is more common in the western groups than elsewhere.

The animal is uniform pale luteous.

13. **Mitra cardinalis** Gronovius. Reeve, l. c., pl. iv., fig. 26.

This fine species, which is not very common, is usually found in shallow water inside the reefs and is generally diffused throughout Polynesia. We have collected examples in all the groups except the Marquesas Isles.

The animal is uniform creamy-white.

14. **Mitra chrysostoma** Swainson. Reeve, l. c., pl. ii., fig. 12.

Common under dead coral on the inner margins of the outer reefs at the Samoa Islands; less abundant at all the other western groups. In Eastern Polynesia it is rarely found at the Society and Panmotu Islands.

15. **Mitra chrysalis** Reeve, l. c., pl. xxv., fig. 200.

Common under dead coral on the reefs at the Viti, Tonga and Samoa Islands; more rare in the Kingsmill group.

It is very closely allied to *M. cucumerina*, from which it differs in its smaller size, less robust form and different color. Our specimens which are larger than Reeve's figure, are 23 mill in length.

16. **Mitra coronata** Chemnitz. Reeve, l. c., pl. xiv., fig. 104a, 104b.

Excepting the Marquesas, we found a few examples of this species at all the South Sea groups. They live under coral on the outer and inner reefs.

The animal is brown, the margins of the foot and tentacles white.

All our examples are very uniform in their specific characters, except a slight variation in the size of the white sutural nodules. They are smaller and more contracted

towards the base than represented in Reeve's figures of Philippine specimens.

17. *Mitra cærulea* Reeve, l. c., pl. xv., fig. 113.

A rare species of which we found four dead but perfect specimens on the fringing reefs at Kioa, Viti Islands.

They were undoubtedly washed up from sandy bottoms outside the reefs. Though a little smaller and narrower towards the base than represented in Reeve's Philippine example, they agree in every other particular with his figure and description. One specimen has the "white flake-like spots" nearly obsolete, and the whole shell is regularly grooved longitudinally so that the sculpture closely resembles that of *Mitra sphærulata*.

18. *Mitra cucumerina* Lamarck. Reeve, l. c., pl. xxv., fig. 201. *Voluta ferrugata* Solender, MS.

A common and variable species found on reefs, and excepting the Marquesas is generally diffused throughout Polynesia. Panmotu examples, which are much larger than obtained elsewhere, are sometimes nearly uniform white. The animal is whitish with creamy-yellow dots.

19. *Mitra cæligena* Reeve, l. c., pl. xxviii., fig. 227.

Four dead examples found under stones at the Marquesas Islands.

They agree in every particular with Reeve's description, but are rather darker coloured than his figure and the pale band is less decided.

20. *Mitra digitalis* Chemnitz. Reeve, l. c., pl. iii., fig. 21.

Obtained sparingly in all the western groups where they were found washed up on the outer reefs.

21. *Mitra episcopalis* L. Reeve, l. c., pl. i., fig. 5.

This fine and well-known species, which is more abundant at the Society Islands than elsewhere, occurs in all parts of Polynesia except the Marquesas. They live inside

the reefs on sandy bottom in the upper region of the laminarian zone.

They differ remarkably in the size of adults, averaging from $2\frac{1}{2}$ to 6 inches in length. We have now before us a fine Society example which is a little larger than Reeve's beautiful figure.

22. *Mitra eburnostoma* sp. nov.

Shell cylindrically fusiform, solid, creamy-white, sparingly mottled with brown; spire rather long with slightly convex outlines; suture crenulate; whorls 9, flatly convex, spirally ridged, ridges rather small, unequal, angular, decussated by longitudinal incised lines which gives the surface a depressly granulated appearance; aperture ivory-white, half the length of the shell; columella with four plaits.

Length 41, diam. 13 mill. (Coll. Garrett).

Hab. Papimotu Islands.

A very rare species of which we found two examples buried in sand in the upper region of the laminarian zone.

The sculpture is almost precisely the same as in *M. sphaerulata*, but may be at once distinguished from that species by its paler color, more slender form and pure white aperture. The latter character connects it with *M. scabriuscula*, but the sculpture is quite different in the two species, and the shape is more regularly fusiform. The outlines are exactly similar to *M. fasciata*.

23. *Mitra eburnea* sp. nov.

Shell small, fusiform, smooth, shining, base strongly recurved, ivory-white; spire rather long, acute, with flattened outlines; whorls embryonal 2, smooth, normal whorls 8, planiform, last one convex, strongly contracted at the base; striated with rather crowded spiral impressed lines and the upper whorls with fine spiral granulated ridges; aperture

half the length of the shell, and furnished with 5 columellar plaits.

Length 12 mill. (Mus. Godeffroy).

Hab. Paumotu Islands.

We found two perfect dead specimens of this very rare *Mitra* on the sands at Anaa Island.

It is closely allied to *M. ancillides* but may be distinguished by its ivory-white color, more contracted base, smaller size and more robust form.

24. *Mitra fasciata* Martyn. Reeve, Conch. Icon., pl. vi., fig. 40. *Voluta casta*, Solander, MS.

This appears to be a somewhat rare species, and occurred to our notice only at the Marquesas, Society and Cook's Islands. They live in sandy-mud in the laminarian zone.

Mr. Reeve is correct in stating that the broad brown band is superficial. Weathered shells are uniform white. The above author's figure, though very accurate, represents a poor specimen. Fine examples have a sharply defined, shining, deep brown-black zone.

25. *Mitra fusescens* Pease. *Mitra (Volutomitra) fusescens* "Pease," Paetel, Cat. Conch., p. 40.

Strigatella fusescens, "Pse." Carpenter, Proc. Zool. Soc. 1865.

I gathered a few examples of this species on the rocky coasts of Hawaii, Sandwich Islands, where it appears to be peculiar.

It can scarcely be distinguished from *M. Ticaonica*, except in being small and having a smoother peristome.

26. *Mitra flammea*, Quoy et Gaimard, Voy. Astrol., vol. 2, p. 659, pl. xlv., fig. 23-25, *Mitra flammigera*, Reeve, Conch. Icon., pl. xxii., fig. 173a, 173b.

Common in the Viti Group, where I obtained many

living specimens by digging in coarse sand at low water mark inside the reefs. It is much more rare at 'Tonga and Samoa. Mr. Pease records it from the Sandwich Islands.

The shell Mr. Reeve described and figured as *flammea*, is not that species, but=*M. Philippinarum* Adams, and his *M. flammigera* is the *flammea*, Q. & G. *Mitra foveolata*, Dunker, is probably a synonym of the latter.

Reeve's description and figure are evidently taken from a discolored specimen. The living shell is a pale olivaceous-grey, mottled and striped with slate color. The aperture and upper half of the columellar lip are blackish-brown and the inner margin of the peristome is whitish. The intermediate ridges mentioned by Reeve are not constant.

27. **Mitra ferruginea** Lamarck. Reeve, Conch, Icon., pl. iv., fig. 28.

Obtained in all parts of Polynesia, except the Marquesas and Sandwich Islands; and more abundant at the Society and Paumotu groups than elsewhere. Invariably found lurking beneath masses of dead coral on reefs.

The animal is cinereous or pale luteous and slightly varied with reddish-brown.

28. **Mitra fulva** Swainson. Reeve, l. c., pl. iv., fig. 24, pl. vi., fig. 45.

Much more rare than the preceding species, and has the same range and station.

Animal chestnut brown, the creeping disk white and the siphon pale brown. The ocular region and tips of the tentacles, white.

Viti examples are more attenuated than specimens inhabiting the other groups. Reeve's variety "*attenuata*" is the most common form.

29. **Mitra filosa** Born. Reeve, l. c., pl. xi., fig. 81a.

This somewhat rare and graceful species only occurred

to our notice at the Viti and Society Islands, where they were obtained in coral sand on the fringing reefs. They are excessively rare and much smaller at the latter group.

Our largest specimens are smaller, lighter colored and more slender than represented in Reeve's figure 81a, which has the spiral ridges too large.

It differs from *nexilis* in its much more attenuated form, longer and more slender spire, lighter color, finer and more distant lirulæ, more produced and contracted base. They also inhabit different stations.

Linnæus' *Voluta filaris* may possibly be the same as our shell.

30. **Mitra humeralis** sp. nov.

Shell small, solid, fusiform, smooth, glabrous, spire acute, base contracted; whorls 7-8, flattened, the last one convex, obliquely striated toward the base; body and penultimate whorl margined next to the suture with an obtuse keel; aperture contracted above, half the length of the shell; peristome slightly sinuous and thickened above; columella with five plaits; color white, the body with two and the spire with one broad yellowish spiral band.

Length 10 mill. (Mus. Godeffroy).

Several more or less perfect examples found in beach sand on the outer coast of Anaa, Panmotu Islands. As compared with *M. peculiaris* it is more robust, and differs in the number and position of the bands, as well as in the absence of spiral striæ.

31. **Mitra ignobilis** Reeve. Conch. Icon., pl. xx., fig. 152.

I obtained two dead but perfect examples of this very rare species on the shore reefs at the Viti group, and a single less perfect one at Huahine, one of the Society Islands.

My largest Viti specimen is one-third larger, and the spire is more produced than the Philippine example figured

by Reeve. The grooves are more or less distinctly punctured, and the spots as represented in Reeve's very accurate figure are disposed in three transverse series on the body whorl. The largest specimen shows the "hair-like" lines mentioned by the above author.

32. **Mitra interlirata** Reeve? l. c., pl. x., fig. 70.

I am somewhat doubtful in regard to the correctness of the identification of the single discolored example now before me, which was found on a sandy-mud flat in the Viti group.

Mr. Reeve's description accords better with our shell than his figure; but as some of his species are poorly delineated, the latter may also be somewhat imperfect.

The spiral ridges are smaller and more compressed than in *M. flammea*, and the one on the shoulder is larger and more prominent than the others. The intermediate smaller ridges mentioned by the above author are confined to the middle of the shell. The whorls of the spire have three spiral ridges, the middle one the larger; *flammea* has four of nearly equal size. The color which is too much faded to be of any use in a comparison, appears to have been mottled similar to the latter species. The aperture seems to have been white.

Mr. Pease considered *interlirata* to be a variety of *flammea*. It is at least very closely related to the latter.

33. **Mitra latruncularia** Reeve, l. c., pl. xxi., fig. 166.

We were fortunate in finding six dead but very perfect specimens of this pretty species on the Kioa shore reefs, Viti Islands.

Our examples are a little smaller and more slender than Reeve's figure which is not very correctly colored. The whole surface is beautifully checkered with numerous small chestnut-brown square spots.

34. **Mitra lugubris** Swainson. Reeve, l. c., pl. xxi., fig. 166.
Mitra (Chrysame) lacunosa Schmeltz. Cat. Mus. Godeff. No. iv., p. 83. *Mitra (Scabricula) lacunosa* Paetel. Cat. Conch., p. 40. *Mitra lugubris* Schmeltz. Cat. Mus. Godeff., No. v., p. 117.

Excepting the Marquesas and Cook's Islands, we found this species distributed throughout Polynesia. Though not uncommon in the Western groups it is very rare elsewhere, and occurs in reefs.

Our shells are colored the same as stated by Reeve and represented in his figure; but the latter is more ventricose, and the description reads "*shell ovate*," whereas our shells are precisely the shape of his *lacunosa*, which he describes as "*oblong-ovate*." He states that *lugubris* is "*encircled with impressed striae*." Several very perfect specimens now before me are all transversely ridged, the ridges more or less convex or angulate and the conspicuously grooved interspaces are punctured. The whole surface is also more or less distinctly grooved longitudinally. The aperture is white or bluish-white and the upper half of the columella lip is deep brown.

It will be observed that the sculpture of our shells are precisely the same as *lacunosa*, but he represents the colors as different, and states that the columella has only four plaits, one less than the shells under consideration.

I am inclined to believe the two species are identical. Reeve's *lacunosa* may have been discolored, and his *lugubris* may have had the transverse ridges so much flattened that the shell appeared to be simply grooved.

The Pacific shells which are shaped and sculptured like the former, with the precise coloration of the latter, are by some authors referred to *lacunosa* and by others to *lugubris*.

35. **Mitra muriculata** Lamarck. Reeve, l. c., pl. xxvi., fig. 205.

A single specimen found washed up on the beach on

the south coast of Vanua Levu, Viti Islands.

It agrees in every respect with Reeve's figure except in being smaller and less robust.

36. **Mitra micans** Reeve, l. c., pl. xxxiv., fig. 285.

One dead but perfect example was obtained on the Rarotonga reef, Cook's Islands.

37. **Mitra nevia** Swainson. Reeve, l. c., pl. vi., fig. 41.

This very rare and graceful species was obtained at Anaa, Panmotu Islands, where we found four tolerably perfect dead shells, and a single much weathered specimen was picked up on the Rarotonga reef, Cook's Islands.

The color is creamy-white, with a few small, irregular, pale brown sutural spots. One example exhibits a few imperfect rows of minute dots of the same color in the transverse grooves.

38. **Mitra nexilis** Martyn. Reeve, l. c., pl. xi., fig. 81b.

Excepting the Marquesas, we obtained this species in more or less abundance at all the South Sea groups, but much more common at the Society, Tonga and Viti Islands than elsewhere. They are invariably found on sandy bottoms inside the reefs.

Our finest examples which were obtained in the Viti and Tonga groups are a little larger than Reeve's excellent figure, and like the latter the spiral cord next the suture is quite obsolete. Society Island specimens are smaller, darker colored and the sutural cord is fully developed.

Contrary to the views of most writers I fully believe this to be a distinct species from *M. filosa* Born.

39. **Mitra nebulosa** Swainson. Reeve, l. c., pl. i., fig. 3.

A rare species of which I found two dead but very perfect examples on the fringing reef near Sandal-Wood Bay, Viti Islands.

Our specimens have the whorls more flattened than

represented in Reeve's figure, and one exhibits the same color and markings. The other is ornamented with numerous narrow longitudinal reddish-brown stripes which are minutely dotted with white. The columella has five plaits.

I am inclined to believe the latter is the form which Dillwyn describes under the name of "*Voluta nubila*" Gmel. variety A, which he says has "*longitudinal interrupted reddish-brown stripes and the pillar five plaited.*"

It is very nearly related to *M. versicolor* Martyn, which is Dillwyn's *Voluta nubila* variety B.

Mr. Reeve on the authority of Mr. Cumıng gives Anna, Pāfımotu Islands as the habitat, which is probably an error.

40. **Mitra oleacea** Reeve, l. c., pl. xiv., fig. 105.

A few examples obtained under large clumps of coral on reefs at the Samoa, Viti and Society Islands.

The spiral incised lines are occasionally obsolete on the middle of the body whorl, and the color though usually olivaceous is sometimes of different shades of brown.

41. **Mitra propinqua** sp. nov.

Shell solid, elliptically-oblong, chestnut-brown with an indistinct irregular pale line on the upper third of the body whorl; aperture and a few small spots near the base, whitish; spire rather short, with slightly convex outlines, suture grooved; whorls 6-7, flat, last one large, convex, all with regular spiral incised lines which are closely punctured; aperture equal to half the length of the shell; outer lip crenulated and the columella with five plaits.

Length 28, diam. 13 mill. (Coll. Garrett).

Hab. Society Islands.

This appears to be a rare species. They were taken from under coral on reefs. It is somewhat similar in shape to *M. punctata* Swain., and like that species is punctate-striate but differs in color and number of columellar plaits.

42. **Mitra peculiaris** Reeve. Conch. Icon., pl. xxxvi., fig. 305.

Two dead specimens found on the shore reef at Kioa, Viti Islands.

They agree in every particular with Reeve's description and figure, except in having fine spiral incised lines and one more columellar plait.

43. **Mitra pontificalis** Lamarck. Reeve, l. c., pl. iv., fig. 23.

Occurs in more or less abundance in all parts of Polynesia. The spiral punctures are not constant.

Animal creamy-white, with opaque-white dots.

44. **Mitra peregra** Reeve, l. c., pl. xxiv., fig. 186.

M. rotundilirata Pease (not of Reeve); Mus. Pease, 1863. *M. coriacea* Schmeltz (not of Reeve); Cat. Mus. Godeffroy, No. iii., p. 33. *Turricula (Pusia) spadicea* 'Dkr.' n. sp., Schmeltz, l. c., No. iv., p. 84; l. c., No. v., p. 119, 210. *Mitra (Pusia) coriacea* Paetel (not of Reeve); Cat. Conch., p. 39.

Under coral on reefs. Excepting the Marquesas and Cook's Islands, occurs in all the South Sea groups, but more abundant at Samoa and the Viti Islands than elsewhere.

I don't think there is much, if any doubt in respect to the correctness of the determination of this species, which agrees very closely with Reeve's short diagnosis and tolerably well with his indifferent figure.

Perfect shells are dark reddish-chestnut, the spiral ribs articulated with tawny-yellow, and the aperture is yellowish-brown. Weathered shells are dark red and the costal spots whitish.

Society Island specimens, which Mr. Pease received of me, were referred to Reeve's *rotundilirata*, which latter is quite a different species.

Mitra coriacea is more slender, and the sculpture and color quite different from our shells.

It belongs to the section or subgenus *Chrysame*, not *Turricula* nor *Pusia*.

45. **Mitra pellis-serpentis** Reeve, l. c., pl. x., fig. 66.

A rather scarce shell found under dead coral on the outer reefs in all the eastern groups except the Marquesas. We also obtained it at the Kingsmill Islands.

Society Island specimens, which attain a much larger size than Reeve's very accurate figure, vary considerably in the small decussated ridges, which become nearly obsolete in some individuals. All are densely striated parallel to the axis of the shell.

As previously stated, it is connected with *M. brumalis* by intermediate forms.

46. **Mitra papalis** Linnæus. Reeve, l. c., pl. ii., fig. 9.

This is a very rare South Sea shell, and only occurred to my notice at the Kingsmill and Caroline Islands. Mr. Reeve on the authority of Cuming gives Anaa, Paumotu Islands as its habitat. I very much doubt its occurrence there; at least after several months exploration in a dozen different islands of that group, and the examination of many collections made by others, I failed to discover a single specimen.

47. **Mitra procissa** Reeve, l. c., pl. xxii., fig. 177.

A few examples occurred under coral on the outer reefs at Samoa and Viti Islands.

Our shells are a little smaller and a trifle more robust than Reeve's figure, though in every other respect they accord closely.

48. **Mitra robusta** Reeve, l. c., pl. xviii., fig. 140.

We obtained this interesting species beneath large water-worn lava stones on rocky coasts, Viti Islands. They were all found in the upper half of the littoral zone, associated with *Patella*, *Littorina* and *Nerita*. It appears to be very

local and abundant at the above group and very rare at Samoa.

They vary in color from cinnamon-brown through all the intermediate shades to deep blackish-brown, and in shape from ovate to ovate-oblong. The latter form differs none from Reeve's description and figure of *M. Woldemarii*, which is very closely allied if not identical with our shells.

49. **Mitra rubritincta** Reeve, l. c., pl. xix., fig. 147.

A very rare species found under dead coral on reefs at Samoa and Viti Islands.

50. **Mitra retusa** Lamarck Ann. du Mus., vol. xvii., p. 217.

Voluta paupercula Schroeter; Einl., vol. i., p. 217, pl. i., fig. 11. *Voluta paupercula* (var.) Dillwyn, vol. i., p. 534. *Mitra virgata* Reeve (part); Conch. Icon., pl. xxv., fig. 197a. *M. retusa* Reeve, l. c., pl. xxv., fig. 199. *M. (Strigatella) retusa* Paetel; Cat. Conch., p. 41. *M. (Strigatella) virgata* Chenu; Man. Conch., vol. i., fig. 1001. *Strigatella retusa* Schmeltz; Cat. Mus. Godeff., No. v., p. 118.

Not uncommon under dead coral and in crevices on reefs, at all the Western groups.

This species has been confounded with *virgata* Reeve, and both with *paupercula* L. They are nevertheless quite distinct. The two latter belong to the genus *Strigatella*, and the species now under consideration is a true *Mitra* as restricted, and will fall in the section or subgenus *Nebularia*. It is in fact much more nearly related to *M. Ticaonica* than to the above two species, with which it has been united.

It is rather surprising that Mr. Reeve should have figured it to represent in part his *virgata* (fig. 197a). His fig. 197b, which is quite a different species should retain the latter name. Dr. Chenu's figure is an exact copy of Reeve's fig. 197a.

The latter author's *retusa*, fig. 199, has very much the aspect of a weathered or rubbed shell, and agrees exactly

with similar examples in my possession. In his description he does not allude to the crenulated peristome which is precisely the same as in *M. Ticaonica*; that is the crenulations occupy nearly the whole length of the lip.

The whole shell is longitudinally strigated with narrow white and deep brown stripes of nearly equal size, so that it is difficult to decide which is the ground color. With few exceptions all have a transverse whitish line on the upper portion of the body whorl. Perfect shells are invested with a thin translucent epidermis which gives the white strips a tawny-yellow color. The aperture and columella are dark brown with whitish plaits.

They vary in the convexity of the body whorl as in the length of the spire. The transverse impressed lines also vary in distinctness and are sometimes obsolete.

51. *Mitra subtexturata*, sp. nov.

Shell solid, ovate, cinereous, with a white aperture; spire short, less than half the length of the shell; whorls, 6, flat, last one large, strongly convex; sculpture consisting of moderately sized angular spiral ribs, 14 on the body, 5 on the penultimate whorl, the narrow interspaces very scabrous with crowded longitudinal laminæ-like striæ, and the whole shell more or less longitudinally guttered; columella, with 5 plaits, and the peristome thick and crenulated; length 19, diam., 11 mill., (Coll. Garrett.) Hab., Society Islands.

The animal is greyish-white, closely maculated with small irregular milk-white spots. The end of the siphon and the upper anterior portion of the foot stained with deep brown.

We obtained several examples in the upper region of the laminarian zone, sandy bottoms, at Raiatea Island.

It is somewhat related to *M. texturata*, but may be distinguished from that species by its uniform pale color,

more abbreviated form and the peculiar intercostal laminæ-like striæ.

52. **Mitra serpentina** Lamarck. Reeve, Conch. Icon., pl. xv., fig. 112a. 112b.

A rare and very beautiful species, of which we found a single dead, but very perfect example on the Kioa fringing reef, Viti Islands, and several more or less perfect ones in the Panmotu group. All the Mitres of this peculiar type burrow in sand.

Our shells are a little smaller than Reeve's largest figure, and have one columellar plait less than stated by the above author. The color is creamy-white, with two light orange bands on the body whorl, and ornamented with longitudinal more or less waved ferruginous lines and spots, which are most conspicuous on the bands, where they have white shadows.

53. **Mitra sphærulata** Martyn. Reeve, l. c., pl. v., fig. 37.

This fine species is generally diffused throughout Polynesia, and, excepting the Society Islands, occurs sparingly at all the groups. At Raiatea, one of the former group, it is so very abundant that I collected about 1500 specimens in a few days. Though very common in that particular locality, it is not by any means abundant elsewhere. They live in sand in the upper region of the laminarium zone. It appears to be absent from the Marquesas Islands.

They vary considerably in the size of adults, but not much in colour. The sculpture is remarkably uniform. It may be readily distinguished by its buff-colored aperture.

54. **Mitra spiripuncta** sp. nov.

Shell acuminate, turreted, slender, white, tinged with rose-red and spirally dotted with light brown, the dots confined to the ridges; whorls 9, spirally ribbed, the ribs slightly crenulated, four on the upper and fourteen on the

last whorl; interstices with two or three raised revolving lines; aperture narrow, a little less than half the length of the shell; outer lip rather thin and crenulated; columella with 5 plaits. Length 17 mill. (Mus. Godeffroy.)

Habitat Viti Island.

A single perfect example was obtained on the Koro reefs.

55. **Mitra scabriuscula** Linnæus. Reeve, Conch. Icon., pl. v., fig. 35.

This fine species is not uncommon at the Society, rare at the Panmotu, and very rare at the Viti Islands. It is invariably found in sandy stations, and *not* on reefs as stated by Reeve.

Our specimens are a little larger and more attenuated than Reeve's figure, which is shaped *too* much like *sphaerulata*, from which it differs in its more acuminate 'spire, more delicate sculpture and different color. The aperture is invariably pure white.

Dr. Græffe obtained examples at Upolu, Samoa.

The animal is diluted-white, maculated with numerous small opaque white spots.

56. **Mitra typha**, Reeve, l. c., pl. xxxiii., fig. 267.

We found four examples of this small rare *Mitra* on the fringing reefs at Kioa, Viti Island.

57. **Mitra tabanula** Lamarck. Reeve, l. c., pl., xxxix., fig. 332.

The single very perfect specimen now before me was obtained in the Viti group, but am unable to state the precise locality.

It agrees in every respect with Reeve's description, and very closely with his incorrectly colored figure. It is shaped like *M. turgida*, and is of a dark brownish-red color, with rather large, keel-like spiral ribs, which are very pale and smooth on their edges.

58. **Mitra testacea** Swainson. Reeve, l. c., pl. xiv., fig. 98.

A very rare species found in the condition of dead shells, on reefs, at the Kingsmill, Cook's, Society, and Panmotu Islands.

Varies considerably in the size of adults, and some examples have the spiral impressed lines so deeply cut that the surface appears to be corded with convex ribs.

59. **Mitra tessellata** Martyn. Reeve, l. c., pl. ii., fig. 10.

This fine large *Mitra* appears to be a scarce shell. A few examples were obtained on reefs at the Kingsmill, Society and Panmotu Islands. I also found two fine specimens at Guam.

Our largest example is 92 mill. in length, the same as Reeve's very accurate figure.

Animal creamy-yellow. The small triangular foot is reddish-brown above, and the siphon is varied with a lighter shade of the same color. The eyes are situated on the middle of the small tentacles.

60. **Mitra texturata** Lamarck. Reeve, l. c., pl. xx., fig. 155.

Four dead, but very perfect examples were collected on the fringing reefs, Viti Islands. Dr. Græffe obtained specimens at Samoa.

Viti shells are more robust and have a shorter spire than represented by Reeve's figure.

61. **Mitra tuberosa** Reeve, l. c., pl. xxx., fig. 237a, 237b.

Excepting the Marquesas, we found this species generally diffused throughout Polynesia; but appears to be rare everywhere except the Viti Islands, where they occurred in considerable numbers in crevices on the fringing reefs.

Our examples which are larger than Reeve's figure, which is slightly magnified, are whitish under a luteous epidermis, the base and the transverse band blackish brown.

62. **Mitra turgida** Reeve, l. c., pl. xxxiii., fig. 273.

M. ericea Pease; Proc. Zool. Soc., 1860, p. 146. *M. peregra* Schmeltz (not of Reeve); Cat. Mus. Godeffroy, No. iii., p. 33.

Common under dead coral at the Viti, Tonga and Samoa Islands, but rare at all the other groups, except the Marquesas and Cook's Islands, where it did not occur to our notice.

Reeve's figure which represents a Philippine example is not so much contracted at the base as noticed in South Sea shells. The color is uniform pale luteous, and the transverse grooves are very faintly striated parallel to the axis of the shell.

63. **Mitra Ticaonica** Reeve, l. c., pl. xxiii., fig. 181.

This rare South Sea *Mitra* only occurred to our notice in the Viti and Society Islands, where we found several examples under coral blocks on the outer reefs.

64. **Mitra telescopium** Reeve, l. c., pl. xx., fig. 80.

Two imperfect specimens collected on the fringing reef at Kioa, Viti Islands.

They coincide well with Mr. Reeve's figure, except in having the spire less produced and of a smaller size. One example is colored exactly like the above mentioned figure, but the two yellow bands which he does not allude to in his description are paler than in his figure. The other specimen has the spire and the upper third of the body whorl pale flesh color.

65. **Mitra Tahitensis** sp. nov.

Shell elongate-ovate, solid, dark brown with paler shades; whorls 8, flatly convex, minutely crenulated at the suture, closely cancellated with longitudinal and spiral impressed striæ, which are most conspicuous on the upper whorls; aperture less than half the length of the shell, pale brown;

outer lip much thickened, crenulated on the inner margin and slightly sinuate above; columella with five plaits.

Length 37 mill. (Mus. Godeffroy).

Hab. Society Islands.

A single very perfect example was found at Tahiti. It belongs to the same group as *M. adusta* and *fusca*.

66. **Mitra ustulata** Reeve. Conch. Icon., pl. xiii., fig. 89.

A single imperfect specimen found at Kioa, Viti Islands.

Though only two-thirds the size of Reeve's figure, it accords in every other respect.

67. **Mitra versicolor** Martyn. Reeve, l. c., pl. i., fig. 2.

A rare species inhabiting sheltered ground inside the reefs at Tonga and Viti Islands.

Our specimens are a little smaller than Reeve's figure and the mottlings are more delicate and less conspicuous.

Martyn's specimens were also collected at the Friendly Islands, = Tonga.

68. **Mitra** sp.

We found three imperfect examples of this rather large *Mitra* on the fringing reefs at Kioa, Viti Islands.

It is quite distinct from any of the species figured in Mr. Reeve's monograph. The specimens, together with the three following species, are deposited in the Museum Godeffroy, Hamburg.

69. **Mitra** sp.

Four examples obtained at Upolo, Samoa Islands.

70. **Mitra** sp.

Three imperfect specimens were collected on the Kioa fringing reefs, Viti Islands.

71. **Mitra** sp.

A single specimen obtained at Samoa.

Genus STRIGATELLA Swainson.

72. *Strigatella acuminata* Swainson. Reeve, Conch. Icon., pl. xx., fig. 158.

Excepting the Marquesas, we obtained a few examples of this species at all the South Sea groups. They occurred under dead coral on the outer reefs.

Some specimens exhibit three faint, transverse bands on the body whorl, which are a shade darker than the ground color. The spire, which has slightly concave outlines, is usually striated with delicate spiral grooves, which are sometimes continued on the body whorl.

Animal uniform luteous yellow.

73. *Strigatella auriculoides* Reeve, l. c., pl. xxviii., fig. 228.

This somewhat rare species is diffused throughout Polynesia, and is found under dead coral on the outer reefs.

Reeve's figure and description accords tolerably well with the five perfect specimens before me, which are not so robust as represented by the above author. The ground color varies from brown to deep brown-black, with a narrow, transverse, more or less interrupted whitish band on the upper half of the body whorl, which latter is also dotted with the same color. The aperture is bluish-white. The whole surface of the shell is encircled with fine punctated incised lines, which are sometimes obsolete on the middle of the body. Outer lip crenulate on the inner margin.

Our largest example, from the Cook's group, is larger than Reeve's figure, and measures 27 mill. in length by 13 in diameter. Weathered shells when deprived of their epidermis are reddish-chestnut with white markings.

Chenu's figure of *Columbella unifascialis* appears to be the same as Reeve's *Mitra auriculoides*.

The animal is deep chocolate-brown. The creeping disk the tentacles and siphon pure white.

74. *Strigatella brunnea* Pease. Amer. Jour. Conch., 1867, p. 215, pl., xv., fig. 7.

Excepting the Marquesas, Tonga and Viti Islands, this rare species occurs at all the other groups, and like the preceding lives under dead coral on the outer reefs.

Perfect fresh shells are dark ashy-brown, olive-brown or chestnut-brown with a bluish-white aperture, and the edge of the outer lip is dotted with light brown.

Animal milk-white.

75. *Strigatella columbellæformis* Kiener. Reeve, Conch. Icon., pl. xviii., fig. 138.

This fine large *Strigatella* which is somewhat rare, occurs beneath large coral blocks on the outer reefs, and was obtained at the Kingsmill, Society, Cook's and Paumotu Islands. In the 'Catalogue Museum Godeffroy' it is recorded from Samoa group. Reeve and other authors cite Madagascar as its habitat.

Our shells vary from uniform dark brown to olive-brown, more or less varied with white under a thin olive-yellow epidermis. The transverse impressed lines mentioned by Reeve are minutely punctured.

The animal is rich chestnut-brown with a diluted-white creeping disk. Head slightly varied with white.

76. *Strigatella litterata* Lamarck. Reeve, l. c., pl. xx., fig. 153.

More or less plentiful in all parts of Polynesia except the Marquesas, where we failed to obtain examples. They are found lurking under dead coral in holes and crevices on the outer reefs.

They are subject to considerable variation in size and character of the markings. Reeve's figure is very accurate.

77. *Strigatella maculosa* Reeve, l. c., pl. xxii., fig. 175; pl. xxv., fig. 194.

This species has the same range and station as the preceding, and is nearly as plentiful.

The only difference between this species and *litterata* is, the latter is more distinctly strigated, larger, and the former has the upper half of the shell pale brownish-buff. Panmotu examples are typical, and are accurately represented in Reeve's second figure. Society Island specimens are larger and more nearly allied to *litterata*, but may be distinguished by the brownish-buff color which marks the upper half of the shell.

78. *Strigatella paupercula* Linnæus. Reeve, l. c., pl. xii. fig. 84.

Distributed throughout all parts of Western Polynesia, and usually found lurking under lumps of dead coral, and in crevices on both the outer and inner reefs. At the Kingsmill Islands I gathered several hundred specimens which were larger and finer than obtained elsewhere.

This species is smooth, with a few basal grooves, and the upper whorls near the apex are spirally striated with delicate incised lines. The thin, subpellucid epidermis gives a yellowish tint to the white stripes, as represented in Reeve's very accurate figure.

79. *Strigatella virgata* Reeve, l. c., pl. xxv. fig. 197b.

This species, which is less abundant, has the same range and station as the preceding.

As stated in my remarks on *Mitra retusa*, Mr. Reeve has figured that shell (fig. 197a.) to represent, in part, his *virgata*, and his description, which is drawn from the two species, should have the following character erased:—"Last whorl encircled round the upper part with a small narrow pale zone," which accords with *retusa* but not with *virgata*.

The species now under consideration, is, without doubt, the same as the above author's figure, 197*b*, which resembles very nearly the South Sea shells. The color and markings are the same as *S. paupercula*, but may be distinguished from that species by its more abbreviate form, more contracted aperture, outer lip more heavily calloused in the inner margin, and the conspicuous spiral grooves. The latter are generally obsolete on the middle of the body whorl, and are frequently punctured. The interspaces between the grooves are either convex or convexly-angulate. Many examples have the body whorl more or less distinctly fluted, a character never observed in *paupercula*, with which it is by some authors united. It is, in my opinion, as closely connected with *litterata* as with the above species.

Dr. Gould, in his "Expedition," cites one of the Paumotu Islands as its habitat, where I very much doubt its being found.

80. **Strigatella zebra** sp. nov.

Shell ovate, solid, smooth, spire short, retuse, base much contracted, obliquely grooved anteriorly, rarely with spiral impressed lines on the upper whorls; dark brownish-black, longitudinally striped with white, the stripes narrow, more or less flexuous, sometimes interrupted; epidermis thin, pale yellowish-brown; whorls 5—6, the last one shouldered and very turgid near the upper portion of the aperture; outer lip with a heavy deposit of callus, slightly crenulate near the base, slightly contracted above.

Found in the Viti and Samoa Islands.

Genus *TURRICULA* Klein.

81. **Turricula amabilis** Reeve. Conch. Icon., pl. xxxiii., fig.

274.

This small species which is rather rare, was obtained at

all the groups except the Sandwich, Marquesas and Caroline Islands. They were found under dead coral on the fringing reefs.

Some of our examples differ slightly from Reeve's description in having the shell alternately banded with white and luteous. The grooves are darker than the ground color of the shell.

In Paetel's catalogue it is recorded from the Sandwich Islands.

82. **Turricula aurantia** Swainson.

Tiara aurantia Swain., (Broderip), Proc. Zool. Soc., 1835. *Mitra pyramidalis* Reeve, l. c., pl. xxvi., fig. 208.

A very rare species of which we found two examples washed up on the lagoon shore at Anaa, Panmotu Islands, the same locality where Swainson's type specimens were obtained.

The genus *Turricula* being now most generally accepted, Swainson's name should be restored, as Gmelin's *aurantia* is embraced in the genus *Mitra* as restricted.

The two examples before me are smaller than Reeve's figure, and the sculpture agrees precisely with his description, and one is exactly the same color as mentioned by him, viz. : orange-yellow, with a white band. The other is white, with two transverse orange-yellow bands on the body whorl.

83. **Turricula amanda** Reeve, l. c., pl. xxxviii., fig. 318.

Occurred in the condition of dead shells on the fringing reefs at Kioa, Viti Islands, where it appears to be not uncommon, and probably inhabits sandy bottoms in deep water. Dr. Græffe obtained examples at Samoa.

Mr. Reeve's slightly enlarged figure, which very accurately represents the species as regards shape and sculpture, is incorrectly colored. He describes the shell as being

white, banded with reddish-brown. Our examples, which are, no doubt, somewhat faded, are the same color, and the bands are always three, as represented in the figure. Living shells are probably banded with dark brown or brownish-black.

84. **Turricula assimilis** Garrett, Proc. Zool. Soc., 1872, p. 481.

A very rare species found under dead coral on the outer reefs at the Cook's, Samoa, and Viti Islands.

An oblong, subfusiform, shining species of a whitish colour, with closely-set slightly-raised deep brown lines.

85. **Turricula angulosa** Martini (?) Reeve, Conch. Icon., pl. xxviii., fig. 223*a*, 223*b*.

I obtained many fine living specimens of this species by digging in sandy mud, at low water mark in sheltered places, at Vanua Levu, Viti Islands.

Not being quite satisfied with the above determination, I have marked it with a doubt.

Our shells are a little smaller than Reeve's fig. 223*a*, which they much more nearly resemble than the larger figure, 223*b*, which has the appearance of a distinct species. He describes the colors as "*light brown, stained here and there with brown spots.*" Viti examples are ashy-slate, and all have a more or less distinct pale band just beneath the sutural angle. The aperture is brownish, with a white zone, and some have the throat bluish-white. The columella is brown, with four or five pale plaits.

The sculpture, which is very uniform and beautiful, consists of about 20 narrow longitudinal ribs, which are decussated with about the same sized but more crowded spiral flattened ridges, which form crenulations at their points of intersection and gives the whole surface a regular foveolate appearance.

The spiral ridge on the angulate shoulder is a little larger than the others and forms a row of larger granules, but not pointed as stated by Reeve. The spiral row of foveæ immediately above the angle is also twice the size of the others, forming shallow square pits with two contiguous ridges next to the suture.

86. **Turricula bilineata** Reeve, l. c., pl. xxxv., fig. 294.

A very rare species of which we obtained two dead specimens on the fringing reefs at Kioa, Viti Islands.

Mr. Reeve's figure and description accords so nearly with our shells that I do not hesitate to consider them the same, though having one columellar plait less than mentioned in his description. His figure shows four plaits the same as our shells. The two spiral lines on a polished blackish-brown ground will readily distinguish the species.

87. **Turricula bella** Pease. Proc. Zool. Soc., 1860, p. 145.

This somewhat scarce species appears to be peculiar to the Sandwich Islands, where they live on sandy bottoms in the upper region of the laminarian zone.

88. **Turricula bicolor** sp. nov.

Shell small, fusiform, slightly shining, cinereous, with two transverse rose colored bands on the body whorl, the upper one traversing the whorls of the spire; spire with slightly concave outlines; whorls embryonal 3, smooth, irregularly increasing, normal whorls 6-7, nearly flat, somewhat shouldered, the last one convex, depressed on the right side, base strongly contracted, granulated and produced into a short recurved canal; surface longitudinally ribbed, ribs smooth, angular, 12-13 on the body whorl, interspaces with fine transverse grooves; aperture narrow, little more than half the length of the shell; peristome moderately thick and distinctly sinuous above; columella with four plaits.

Length 8 mill. (Mus. Godeffroy).

Hab. Samoa and Panmotu Islands.

A somewhat rare and beautiful species found beneath dead coral on the outer reefs. It belongs to the same group or section as *T. exquisita* and differs from that species in its larger size, fewer ribs, more distant transverse grooves and wants the sharp spiral brown lines.

89. **Turricula Cumingii** Reeve. Conch. Icon., pl. x., fig. 67.

This is one of the rarest and most beautiful of the South Sea *Mitres*. We were fortunate in taking a large and very perfect example on the outer reef at Makimo, one of the Panmotu Islands; also a single and very much worn specimen was picked up on the beach at Upolo, Samoa Islands.

Mr. Reeve's poor figure gives no idea of the beauty of this shell. Our Panmotu example, which is larger than the above-mentioned figure, is a rich shining orange-red, mottled with pure white, and the transverse grooves on the orange-red ground are lined with chocolate-brown. The aperture is the same, but darker than the ground color. The whorls are crenulated next to the suture, and the grooves gradually become obsolete towards the apex.

90. **Turricula cadaverosa** Reeve, l. c., pl. xxi., fig. 160.

Very abundant, buried in sand in the upper region of the laminarian zone, inside the reefs at the Society, rare at the Panmotu, Samoa and Viti Islands.

Mr. Reeve, on the authority of Cuming, frequently gives the station of the sand *Mitres* "*under stones*," where they are *never* found except when dragged there by hermit crabs.

Reeve's figure of this species, which very correctly represents the sculpture, is too robust to accord with the usual form. They are subject to considerable variation in the size and number of the ribs, and in the distinctness of the two angles on the body whorl, as well as in the size of the

tubercles. When they depart so widely from the type, they can scarcely be distinguished from *T. Pacifica*, Reeve. The band is occasionally obsolete, and is usually more or less interrupted.

91. **Turricula concinna** Reeve, l. c., pl. xxvi., fig. 203.

A few more or less perfect dead shells were found on the reefs at Samoa and Viti Islands.

Our examples, which are somewhat faded, accord very nearly with Reeve's figure and description of a Philippine specimen. The Polynesian shells vary from yellow to orange-yellow with the interspaces between the transverse ridges brownish-red, and the third ridge beneath the angle is white as represented in the above mentioned figure but not alluded to in the text. Some examples have the angle on the upper portion of the whorls nearly obsolete.

92. **Turricula crocata** Lamarck. Reeve, l. c., pl. xxvi., fig. 206.

Like the preceding species dead specimens only, occurred on the reefs at all the groups south of the equator, except the Marquesas and Panmotu Islands.

Our examples are light orange-yellow, and like the preceding species which they closely resemble in shape and sculpture, have a similar transverse white band on the third ridge beneath the angle. The ridges are more distinctly granulated than on *concinna*, which with the concolored interspaces will at once distinguish it from the latter.

93. **Turricula consanguinea** Reeve, l. c., pl. xxx., fig. 241.

More abundant than the two preceding species, and occurs at all the groups except the Caroline and Marquesas Islands. Found under dead coral on the outer and inner reefs.

Our shells which are darker than Reeve's figure, are deep brownish-red, and all have a transverse row of whitish

spots on the middle of the body whorl, and smaller ones may be observed on the base and spire. The outer lip and columella are also more or less stained with brownish-red. They vary considerably in the length of the spire, which is generally shorter than in Reeve's figure, and one large example before me has it a trifle more produced. The spiral striæ are minutely punctured.

It is frequently confounded with *T. dermestina*, with which it is very closely allied.

94. **Turricula crebrilirata** Reeve, l. c., pl. xiii., fig. 92.

I found several dead specimens on the fringing reefs at Kioa, Viti Islands.

Though only two-thirds the size of Mr. Reeve's figure of a Ceylon example, they agree so exactly with his description, except in color, that I do not hesitate to consider them the same. Our shells are dark ashy-brown, and all have the pale line on the upper portion of the body-whorl.

95. **Turricula concentrica** Reeve, l. c., pl. xvii., fig. 128.

I obtained many living specimens of this species by digging in sand in the upper region of the laminarian zone, in a sheltered place at Kioa, Viti Islands. Though carefully searched for, I failed to get a single example in any other part of the group. Reeve states that Mr. Cuming found it on the reefs at Anaa, Panmotu Islands.

Our shells are smaller, more slender, and the wide basal band is paler than represented in Reeve's figure.

The ground color is a pale flesh tint, and the band varies from tawny-flesh to light brown.

96. **Turricula cruentata** Chemnitz. Reeve, l. c., pl. xvii., fig. 126.

We gathered a few living specimens of this species in a sheltered bay on the east end of Vanua Levu, Viti Islands. They were found adhering to stones and driftwood in shallow

water on a sandy-mud flat.

They agree closely with Reeve's description, but his figure, which is a little larger than our shells, is very poor.

The color is ashy-brown, encircled with a whitish band, and the ribs vary from light yellowish-brown to brownish-orange. The conspicuous transverse incised lines, though generally continuous, are sometimes interrupted by the ribs.

97. *Turricula cimelium* Reeve, l. c., pl. xxxii., fig. 260.

T. (Pusia) nodulosa Pease. Amer. Jour. Conch., 1867, p. 214, pl. xxv., fig. 5.

A few specimens found on sandy beaches at the Panmotu and Society Islands.

Mr. Reeve's very accurate figure and description coincides exactly with our specimens, except in not mentioning the fine, crowded, transverse, impressed lines or striæ. His figure represents the transverse, interrupted brown lines very correctly. They are confined to the right slope of the longitudinal ribs, and do not extend quite to the nodules on the shoulder of the body whorl.

All the specimens I sent to Mr. Pease were too much worn to be of any use in identification or description.

98. *Turricula crisa* Garrett. Proc. Cal. Acad. Sciences, 1871, p. 201.

A few specimens taken in sandy-mud a little below low-water mark, inside the reefs at Upolu, Samoa Islands. A single large dead example occurred in the Viti group.

The livid color, angular whorls, crisp-like and foveolate surface, and the violaceous columella are its most essential characters.

99. *Turricula castanea*, sp. nov.

Shell oblong, rather thick, turreted, shining, longitudinally plicately-ribbed, ribs somewhat angular, closely set; interspaces concave and marked by transverse impressed

striæ ; whorls 8, flatly convex, last one contracted and slightly granulated at the base ; aperture bluish-white, a trifle less than one-half the length of the shell ; columella with four plaits ; colour dingy-brown, with a single pale revolving line.

Length 18 mill. (Mus. Godeffroy.)

Hab. Samoa and Viti Islands.

Three dead examples found on the fringing reefs at the above groups.

100. **Turricula diachroa (Mitra)** Adams and Reeve. Voy. Samar., pl. x., fig. 29.—*Mitra Graffi*, Crosse, Jour. de Conch., 1867, p. 297, pl. xi., fig. 6.

Not uncommon under clumps of dead coral in the lower region of the littoral zone, inside the reefs at Samoa, and more rare in the Viti and Tonga Islands. They are usually found associated with *Engina mendicaria* which they resemble so closely in shape and color as to be easily mistaken for small specimens of the latter species.

M. Crosse's figure, which is slightly enlarged, very correctly represents the usual form. They, however, frequently differ in being more slender, and the ribs are sometimes nearly obsolete. The bands which are generally three on the body whorl, the upper one following the course of the spire, are flesh-white under a thin luteous epidermis on a jet-black ground. The aperture and triplicate columella are tinted with purple-brown.

Animal black. The foot is oblong, margined with yellow, slightly auriculate in front, and about three-fourths the length of the shell. Siphon rather long, irrorated with white. The pale tentacles are marked by two black zones.

- 101 **Turricula discoloria** Reeve. Conch. Icon., pl. xxix., fig. 230.

We obtained several more or less perfect specimens of

this species on the shore reefs at Kioa, Viti Islands.

Our examples agree in every particular with Reeve's description and figure, except in the absence of the pink bands, which are not represented in the latter, though alluded to in the text. The "burnt black" spots between the ribs, which are faithfully represented in his figure, appear to be constant. The bands are whitish, under a very thin luteous epidermis, which is generally more or less worn off in the most perfect examples. Between the spots the ribs are of a burnt-umber color, as represented in Reeve's figure. The basal granules are whitish on a burnt-black ground. The locality was unknown to Mr. Reeve. Paetel records it from the Philippine Islands.

102. *Turricula exasperata* Chemnitz. Reeve, l.c., p. xxi., fig. 162.—*Mitrea arenosa*, Lamarck. Reeve, l. c., p. xxi., fig. 161.

This elegantly sculptured species appears to be confined to Western Polynesia, where they occur at all the groups. We gathered thousands of living examples at the Tonga and Viti Islands by digging in clear sand and sandy mud at low water.

Mr. Reeve gives the station "under stones" where they *never* occur except when dragged there by hermit crabs. All the *Mitres* of this type bury themselves in sand and only come to the surface during the night.

Reeve's accurate figure, which represents a Philippine example, is a little larger than our shells and may be considered the typical form.

The whole surface is covered with small granules formed by the longitudinal and transverse incised lines. The ribs vary considerably both in size and number, and sometimes are nearly obsolete. The angle on the shoulder is also subject to variation and is occasionally very indistinct. The

color is white or cinereous, and sometimes nearly uniform blackish-brown. The ribs are frequently lineated with light brown or blackish-brown, the lines often interrupted so as to form two transverse rows of linear spots which gradually merge into the conspicuously banded variety which represents Lamarck's *arenosa*.

103. *Turricula exquisita* Garrett. Proc. Zool. Soc., 1872, p. 842.

This lovely little shell inhabits the Viti, Samoa, Cook's, Society and Panmotu Islands. The few living examples which came under my observation were obtained from beneath large blocks of dead coral, on the outer reefs.

Its small size (5 mill.), slender fusiform shape, shining pinky-red color with two transverse brown lines inclosing a white band, numerous plicate ribs and transverse impressed lines will readily distinguish it.

104. *Turricula Emilieæ* Schmeltz. Cat. Mus. Godeffroy, No. 5, p. 119.

T. (Costellaria) plicatula Pease. Amer. Jour. Conch., 1867, pl. xv., fig. 4.

A few more or less perfect dead specimens were found in beach sand at Anaa, Panmotu Islands.

Mr. Pease's name being preoccupied for a fossil species, it has been changed as above.

It is a small, oblong-ovate shining species of a reddish-chestnut or light brown, with three yellowish or pale brown transverse bands on the body whorl.

105. *Turricula flammulata* (Mitra) Pease. Amer. Jour. Conch., 1867, p. 212.

Mitra zebrina Garr. Proc. Zool. Soc., 1872, p. 842.

A very rare species ranging from the Panmotu to the Viti Islands. Mr. Pease records it from the Sandwich Islands. All my examples were found in a more or less

perfect though dead condition on the outer reefs.

The smooth shining surface, numerous narrow longitudinal flexuous brown stripes on a bluish-white ground are its most obvious characters.

106. *Turricula flexicostata*, sp. nov.

Shell acuminate turreted, rather slender, ashy-brown, with a single narrow pale zone on the upper portion of the body whorl, which is continued upward on the middle of the whorls of the spire; whorls 9, convex, longitudinally plicately ribbed, ribs narrow, smooth, flexuous; interstices with rather close, transverse incised lines; base contracted, slightly produced and somewhat twisted; aperture less than half the length of the shell, brownish with a whitish zone; columella with four plaits.

Length 15; diam. 5 mill. (Coll. Garrett).

Hab. Paumotu and Viti Islands.

A few more or less perfect dead specimens found on sandy beaches.

As compared with *obeliscus*, the nearest allied species, it is much smaller, differently colored, the ribs smoother, more flexuous and the narrow pale zone is nearer to the suture on the body whorl and more distant on the spire.

107. *Turricula festiva*, sp. nov.

Turricula formosa Garr. M.S. (not of Pease).

Shell acuminate turreted, somewhat fusiform, cinereous, slightly mottled with ashy-brown; whorls 8, flatly convex, angulate beneath the suture, longitudinally plicately ribbed, ribs narrow, rather closely-set, rather nodose on the angle; interstices transversely striated with impressed punctured lines; aperture elongate; columella with five plaits.

Length 13 mill. (Mus. Godeffroy).

Hab. Viti Islands.

During two years' collecting in the above group I found

two examples only (living), which were dug out of sandy-mud near low water mark in Sawa Sawa Bay. The general aspect of the shell is somewhat like *T. Michauui* Crosse & Fischer, but differs in color and details of sculpturing.

108. **Turricula fusco-nigra**, sp. nov.

T. nigricans Garr. M.S.

Shell acuminate turreted, slender, somewhat fusiform, base contracted, slightly produced into a slightly twisted canal; dark brownish-black, with a whitish spiral line above; whorls 10, flatly convex, somewhat roundly shouldered, longitudinally ribbed, ribs small, rounded, narrower than their interspaces, about 14 on each whorl; interstices with large crowded transverse grooves; aperture less than half the length of the shell, black or livid within; columella with four plaits.

Length 18 mill. (Mus. Godeffroy).

Three dead examples found on the Kioa shore reefs, Viti Islands.

109. **Turricula fortiplicata** Pease. Amer. Jour. Conch., 1867, p. 213, pl. xv., fig. 3.

Several examples found in beach sand at Anaa, Papmotu Islands.

A small species with stout plicate ribs, impressed striæ in the interspaces, and of a light chestnut color with the base and apex whitish.

110. **Turricula Gruneri** Reeve. Conch. Icon., pl. xvi., fig. 119.

A single example was picked up on the sands at Upolu, Samoa Islands. It is also recorded from the Pelew group.

111. **Turricula Hoyti** sp. nov.

Shell oblong, fusiform, rather solid, shining, whitish, mottled and striped with chestnut brown; spire moderate, with flattened outlines; whorls 8, planulate, slightly shouldered, last one large, convex, strongly constricted at the base,

longitudinally ribbed ; ribs small, rather distant, somewhat angular, indistinctly constructed beneath the suture ; interstices with rather crowded, transverse impressed lines ; aperture nearly half the length of the shell ; columella with four plaits.

Length 14 mill. (Mus. Godeffroy).

Hab. Viti Islands.

A single specimen found on the sands at Kioa Island.

112. *Turricula instricta* sp. nov.

Shell small, oblong, fusiform, slightly shining, cinereous, with a dark line just beneath the suture, and the aperture with a brown band ; spire moderate with slightly convex outlines ; whorls 7 (?) ; (apex fractured), convex, last one very slender towards the base, which is produced into a recurved canal ; surface longitudinally ribbed, ribs rather small, angular, about 14 in the penultimate whorl, constricted just beneath the suture, forming a row of nodules ; interstices transversely impressly striated ; base granulated ; aperture narrow, nearly half the length of the shell ; peristome rather sharp, with a distinct sinus above ; columella with 4 plaits.

Length 8 mill. (Mus. Godeffroy).

Hab. Viti Islands.

A single specimen found on the shore reef at Kioa Island.

113. *Turricula lyrata* Lamarck. Reeve, Conch. Icon., pl. vii., fig. 46.

This beautiful species which only occurred to our notice at the Samoa and Viti Islands, is not by any means common. All our living examples were found buried in muddy-sand in the upper region of the laminarian zone.

Our examples are more of an olive-gray tint than "ashy-blue" as stated by Reeve, and the narrow brown bands are constant. The aperture is bluish-white, the outer lip and

columella varied with brown.

114. **Turricula luteo-fusca (Mitra)** Garrett. Proc. Zool. Soc., 1872, p. 842.

Two dead specimens occurred on the Raratonga reef, Cook's Islands.

A small shining species of a yellowish-brown color, varied with large whitish spots.

115. **Turricula luculenta** Reeve. Conch. Icon., pl. 30., fig. 245.

A rather scarce species of which I found several examples lurking under dead coral on reefs at Samoa, Tonga and Viti Islands.

Our specimens, which are the same size as Reeve's figure of a Philippine shell, are alternately banded with luteous and chocolate-brown.

116. **Turricula leucodesma** Reeve, l. c., pl. xxx., fig. 243.

Three examples found adhering to dead coral on a sandy-mud flat on the eastern part of Vanua Levu, Viti Islands.

Our shells agree well with Mr. Reeve's description and tolerably well with his poor figure. The color is nearly jet-black, encircled by a chain of large white spots.

Mr. Brazier records it from Torres Straits.

117. **Turricula lauta** Reeve, l. c., pl. xxx., fig. 244.

Excepting the Marquesas, this rather rare species occurred to our notice at all the groups where they were found under dead coral on reefs.

The color varies from dark brownish-red to nearly black with orange-yellow ribs. Sometimes the middle of the body whorl is encircled by a row of spots which are a little paler than the ribs. The pale aperture is not spotted with brown or dark red as in *dermestina* and *consanguinea*.

The interspaces between the smooth ribs are finely and closely striated with transverse incised lines which under the lens are closely punctured.

It is very closely allied to the above two species.

118. *Turricula laevicostata* sp. nov.

Shell small, elongate, fusiform, shining, white, more or less stained with straw-yellow; spire rather long, acute; whorls 8, planulate, last one narrow, convex, contracted and recurved at the base; longitudinally costate, costæ small, smooth, rounded, interstices with transverse impressed striæ; aperture narrow, with very prominent liræ; outer lip rather thick, and slightly sinuous above; columella with five plaits.

Length 10 mill. (Mus. Godeffroy).

Hab. Panmotu Islands.

Two examples found on the sands at Anaa Island.

119. *Turricula microzonias* Lamarck. Reeve, Conch. Icon., pl. xxiv., fig. 185, pl. xxvi., fig. 202.

Notwithstanding the wide range of this species, it is, indeed, a very scarce shell. It occurs in all parts of Western Polynesia, and in the Eastern groups we obtained it at the Society and Panmotu Islands.

The only two living examples found were taken from the under side of stones on the shore reef at Kioa, Viti Island.

Of Reeve's two poor figures the second one is the most correct. Both Lamarck's and the above author's description refer to faded examples.

When perfect, the color is jet-black. The white zone, which is constant, usually consists of a chain of small white spots, but is sometimes expressed by a simple continuous line. Some examples have a second line beneath the middle zone. The aperture is bluish-white, margined with brown-black. The columellar plicæ are bluish-white on a more or less dark brown ground.

The ribs are sometimes nearly or quite obsolete on the back of the body whorl. Mr. Reeve does not allude to the peculiar plicately wrinkled base, which latter is

also obliquely ridged.

120. *Turricula mucronata* Swainson. Reeve, l. c., pl. 17, fig. 125.

This species, which appears to be rather scarce, was found buried in sand inside the reefs, in shallow water, at the Society and Papmotu Islands.

It is shaped very much like *T. concentrica*, and has a similar wide basal band, but may be readily distinguished by the double row of sharp tubercles and granulated base.

The animal has the upper surface of the foot a rich reddish-brown, irregularly dotted with yellow, and the creeping disk cinereous. Siphon dusky with yellow dots.

121. *Turricula millecostata* Swainson. Reeve, l. c., pl. xxxvi., fig. 301.

Of this very rare species we have found only four dead examples on the outer beach at Anaa, Papmotu Islands, the same locality of Swainson's type specimens.

The color appears to be somewhat variable: one specimen is dark chestnut with a white apex, as mentioned by Reeve, and two are orange-yellow, with two broad interrupted ferruginous bands. The other is reddish-chestnut, faintly mottled with orange-yellow, with two remote transverse lines of the latter color. The transverse impressed striæ extends over the whole surface, and the base is conspicuously granulated.

Mr. Reeve's figure correctly represents the shape, but the color is different from any specimens known to me, and does not accord with the text.

122. *Turricula modesta* Reeve, l. c., pl. xxxi., fig. 254.

Several dead specimens found on sandy flats at Samoa and Viti Islands.

Our examples, though of smaller size than represented by Reeve, agree in every particular with his description and

very accurate figure.

123. *Turricula multicostata* Swainson. Reeve, l. c., pl. xxxviii., fig. 322.

A rare and beautiful species, inhabiting all the groups South of the Equator, except the Marquesas and Tonga Islands. On the outer reefs, and found only in the condition of dead shells.

The narrow white zone mentioned by Reeve is sometimes nearly obsolete or reduced to a thread-like line. The base is distinctly granulated, and the whole surface exhibits distant incised lines between the ribs.

124. *Turricula Michauii* (Mitra) Crosse et Fischer. Jour. Conch., 1864, p. 337.—*Mitra rigida*, Reeve, not of Swainson, Conch. Icon., pl. xxii., fig. 169.—*Turricula* (*Costellaria*) *Dunkeri*, Schmeltz, Cat. Mus. Godeff., iv., p. 84; *T. (C.) Deshayesii*, Schmeltz, (Reeve?) l. c., v, page 119.

We obtained hundreds of living examples of this elegant species by digging in sand near low water mark in sheltered places at the Tonga and Viti Islands.

Our specimens, which are the same size as Reeve's figure have three rows of brownish-orange spots on the body whorl, the upper one continued up the spire. The ground color is white or bluish-white, and the aperture is marked with two transverse brownish patches in the throat. All have the interspaces between the ribs more or less distinctly striated with transverse incised lines.

Not having access to Swainson's Zoological Illustrations, I am unable to form an opinion with respect to Reeve's determination of this species, of which he gives a good figure, which only differs from our examples in having one more row of spots on the whorls of the spire. He gives no locality.

Messrs. Crosse and Fischer who had an opportunity of examining Cochin China specimens, state that Reeve's *rigida*

is not Swainson's species. Presuming their conclusions to be correct I have adopted their specific name. They mention four rows of spots on the body and two on the spire.

It has been referred to Reeve's *Deshayesii*, which is described and figured as simply noduled on the angle, smooth beneath, and no ribs mentioned.

125. **Turricula modicella**, sp. nov.

Shell small, fusiform, glossy, white, with the upper portion of the whorls and base tinged with brown; spire rather long, with concave outlines; base strongly contracted and produced into a short, slightly twisted canal; whorls embryonal two, smooth, normal whorls six, flatly convex, somewhat roundly shouldered, last one slightly turgid; longitudinally ribbed, ribs smooth, angular, about 13 on the body whorl; interstices transversely impressly striated; aperture narrow, less than half the length of the shell; outer lip with a slight sinus above; columella with three plaits.

Length 7 mill. (Mus. Godeffroy).

Hab. Paumotu Islands.

A rare and pretty species of which we found several examples under coral on the outer reefs.

126. **Turricula nodosa** Swainson. Reeve, Conch. Icon., pl. xxv., fig. 196a, 196b.

Excepting the Marquesas, this species was obtained at all the South Sea groups, where they are found on the inner margins of reefs.

They vary, some in the size of the tubercles and in the distinctness and number of incised lines. At some of the Paumotu Islands, where they are more abundant than elsewhere, a small variety occurs which has a row of pale slate-colored spots on the middle of the body whorl, the spots confined between the ribs. Some have a slate-colored band articulated with orange-yellow.

127. **Turricula obeliscus** Reeve, l. c., pl. xv., fig. 107.

Several dead examples of this rare species were found on a sandy mud flat at Kioa, Viti Islands.

All our specimens exhibit the same style of sculpture as mentioned by Reeve, and are shaped exactly like his figure. The most perfect examples are of a yellowish-brown color, rather paler on the ribs, and all are encircled with the white line mentioned by the above author. Three specimens which are somewhat weathered appear to have been of a deeper brown than the typical color.

The interspaces between the ribs are marked by rather large closely-set transverse grooves. The largest example which is the same size as Reeve's figure has 12 convex whorls divided by a rather deep suture.

128. **Turricula purpurata** Reeve, l. c., pl. xxxiii., fig. 275.

A few specimens of this pretty species were found on the outer sandy beaches at Anaa, Paumotu Islands.

Our examples which are more or less rubbed agree closely with Reeve's description and figure, except in being of a light pink color with traces of a white zone, and some seem to have had spots or streaks of the same color on the ribs. The description reads "*interstices impressly cancellated*," which term appears to signify that the impressed lines are interrupted by the ribs and not continuous as in our specimens.

Notwithstanding the above discrepancy I do not hesitate to consider our shells identical with the Philippine species.

129. **Turricula patriarchalis** Gmelin. Reeve, l. c., pl. xix., fig. 146a, 146b.

A few dead specimens of this handsome species were found washed up on beaches at the Samoa and Viti Islands.

They differ considerably in the development of the nodules on the shoulder, and the broad band varies from

dark red to deep brown-black. Our largest specimens are the same size as Mr. Reeve's figures of Philippine shells. I obtained some fine examples at the small group of Aiou Islands near Waigion in the eastern part of the Moluccas.

130. **Turricula Pacifica** Reeve, l. c., pl. xxxiii, fig. 272.

Not uncommon, buried in sand in shallow water, inside the reefs at the Panmotu, Society, Samoa, Viti, and Kingsmill Islands. u

The brown band, which is seldom continuous, usually consists of a row of small spots, which are frequently nearly or quite obsolete. The longitudinal ribs vary much in size and number, and some of the forms gradually pass into *T. cadaverosa*, with which it is more nearly allied than with *exasperata*, as stated by Reeve.

131. **Turricula plicata** Klein. Reeve, l. c., pl. viii, fig. 56.

A single perfect adult and a young example was found buried in sand at the Caroline Islands.

The adult specimen, which is one-fourth smaller than Mr. Reeve's figure, is not nearly so gaudily colored, but agrees precisely in coloration as mentioned in his description. He does not allude to the transverse impressed lines, which are very distinct.

132. **Turricula porphyretica** Reeve, (?) l. c., pl. xxv, fig. 195.—*T. ventricosa*, Garr. MS.

A very rare species, of which we obtained two examples on the outer reefs at the Samoa and Viti Islands.

Our two shells, which are a little larger than Reeve's figure of a Philippine example, agree very nearly in shape and sculpture with the above species. The Viti specimens are differently colored, the ribs smaller, more numerous and are distinctly striated with spiral impressed lines; the latter character is neither alluded to in the text or represented in the figure. However, after some hesitation I have adopted

Reeve's name with a doubt, using mine as a synonym, which latter can be retained if it should prove to be new to science.

In order to assist in clearing up the doubt, I subjoin the following description :—

Shell solid, ovate, ventricose, slightly shining, rapidly tapering towards the base, longitudinally plicately ribbed ; ribs rather small, decussated with impressed lines and granulated near the base ; whorls 9-10, planulate, angulately shouldered ; aperture half the length of the shell, bluish-white, varied with brown ; columella four-plaited ; outer lip crenulate ; color dingy-brown, with two pale transverse lines ; upper whorls whitish.

Length 22 mill. (Mus. Godeffroy).

133. **Turricula pulchra**, sp. nov.

Shell acuminate turreted, solid, subfusiform, slightly shining, contracted and obliquely grooved towards the base, which is somewhat twisted ; whorls 9-11, nearly flat, angularly shouldered, longitudinally plicately-costate, costæ smooth, 12 to 14 on the body ; interstices with fine longitudinal striæ and with or without transverse impressed lines ; columella four-plaited ; aperture about two-fifths the length of the shell. Color variable ; whitish, bluish-white, ashy-blue, ashy-green, brown with pale ribs, and generally with four or five transverse fillets of small alternately orange-yellow and brown spots ; some of the dark examples have a whitish spiral line and the articulated fillets are nearly obsolete ; aperture and columella brownish with a pale zone above.

Length 18, diam. $6\frac{1}{2}$ mill. (Coll. Garrett).

Hab. Viti and Samoa Islands.

About 30 fine living examples were obtained by digging in sandy-mud at low water mark at Kioa, Viti Islands, and a few smaller ones at the Samoa group. Specimens from the latter group are only about half the size of the Viti

examples and are equally as variable in color.

It is closely related to *T. Michauii* in shape and sculpture, but quite different in the character of the markings, and the shoulder is more tabulate. The upper termination of the ribs are less nodulous and the color of the columella differs.

134. **Turricula putillus** Pease. Amer. Jour. Conch., 1867, p. 214, pl. xv., fig. 24.

A few specimens found in beach sand at the Paumotu and Society Islands.

Mr. Pease's type specimens, which were obtained from one of the small guano islands in "Central Pacific" are a little larger than our shells.

Rubbed specimens are reddish-brown, and when fresh, black or brown-black with a more or less distinct narrow white zone, and most generally with a few large white spots on the upper half of the shell. The whole surface is regularly granulated.

135. **Turricula Peaseii**, sp. nov.

Shell elongate, fusiform, shining, ashy-grey, transversely lineated with light brown and marked above with a spiral ashy-white line; spire rather long, acute; whorls 9, flatly convex, subangulate above, longitudinally plicately ribbed; interstices concave, transversely striated with impressed lines; base contracted, granulated, produced and slightly twisted to the left; aperture a little more than half the length of the shell, bluish-white stained with brown; columella four plaited.

Length 23 mill. (Mus. Godeffroy).

Hab. Viti Islands.

Only two examples found in sandy-mud at low water mark at Vanua Levu Island. It is shaped very much like *T. lyrata*.

136. *Turricula propinqua*, sp. nov.

Shell elongately fusiform, ashy-white, spire rather long, turreted, longitudinally ribbed; ribs angular, as large as their interspaces, 14 on the last whorl, intersected by small transverse ridges; whorls 9, angulately rounded on the shoulder, where two of the spiral ridges are wider apart than elsewhere and slightly noduled; base strongly contracted and produced into a short slightly twisted canal; aperture nearly half the length of the shell; columella with five plaits, the upper one remote and large.

Length 15 mill. (Coll. Garrett).

Hab. Viti Islands.

A single example found in beach sand at Kioa Island. It closely resembles *T. modesta* Reeve, but is more contracted at the base, and the transverse ridges are much smaller and more numerous. It is shaped very much like *T. Pharaonis* H. Ads., which inhabits the Red Sea, but is smaller, differently colored and the ribs are more numerous.

137. *Turricula rosea* Swainson. Reeve, Conch. Icon., pl. xxxvi., fig. 300.

Two dead specimens found in beach sand at Anaa, Pāmotu Islands.

Our two shells differ none from Reeve's description and figure except in having the upper portion of the last and two preceding whorls, white. The transverse row of small brown spots between the ribs, can be seen on our perfect specimen.

Mr. Swainson's type examples were obtained in the same locality as our shells.

138. *Turricula rubra* Swainson. Reeve, l. c., pl. xxxv., fig. 285, pl. xxxvi., fig. 298.

Several specimens found in beach sand at the Pāmotu Islands, where Mr. Cuming obtained Swainson's type examples.

139. *Turricula subulata* Lamarck. Reeve, l. c., pl. xi., fig. 79.

A single dead example was found on a sandy flat on the south coast of Vanua Levu, Viti Islands. Mr. Reeve on the authority of Cuming cites Anaa, Panmotu Islands, as one of its localities.

As compared with Reeve's indifferent figure, which does not represent the longitudinal ribs, it is larger and the spire is not so slender. The numerous small ribs are very regularly disposed and about the same size as their interspaces. The whole surface is marked by equidistant transverse incised lines, which gives the shell a regular cancellated appearance.

The color which undoubtedly is somewhat faded is creamy-yellow with traces of white patches.

140. *Turricula semifasciata* Lamarck. Reeve, l. c., pl. xvii., fig. 131a, 131b.

Numerous living specimens were obtained by digging in sandy localities, a little below low water mark, inside the reefs at Samoa, Tonga and Viti Islands. It is also recorded from the Caroline Islands.

None of our numerous example are so large as Reeve's figure *a*, and only very few equal in size his smaller variety *b*. The color varies from pale flesh white to cinereous, and the bands on the basal portion of the body whorl vary from yellowish-olive to olive brown; all have the three transverse brown lines on the last whorl, which are also articulated with yellowish.

141. *Turricula stigmataria* Lamarck. Reeve, l. c., pl. iii., fig. 15.

This lovely species, which is somewhat rare, only occurred to our notice at Rioa and Vanua Levu, Viti Islands, where we found a few living examples by digging in sandy-mud, at low water mark, in sheltered bays. Some had buried themselves at a depth of two feet. It is also recorded

from Samoa and the Pelew Islands.

Our specimens are one-third smaller than Reeve's figure of Philippine examples, but agree in every other particular.

142. **Turricula speciosa** Reeve, l. c., pl. xix., fig. 148.

This rare and handsome species occurred only in the condition of more or less perfect dead shells. They were found on the outer reefs at the Cook's and Panmotu Islands.

Our shells differ none from Reeve's description and figure of Philippine examples, except in the ribs being somewhat angular and nodulose next the suture; the latter character though faintly expressed in the above mentioned figure is not alluded to in the text.

143. **Turricula tusa** Reeve, l. c., pl. xxxiv., fig. 283.

This interesting little species which is rarely obtained, occurs under dead coral at the Panmotu, Society, Sandwich and Samoa Islands.

They accord in every particular with Reeve's description and figure of a Philippine specimen. The upper third of the body whorl and the spire exhibits large tessellations on a white ground, the spots and lower portion of the body whorl varies from reddish-brown to blackish-brown. A single transverse white band marks the deep brown aperture. The upper portion of the whorls are distinctly concave and the ribs granulated.

The animal is greenish-white, and beautifully marbled with chocolate-brown.

144. **Turricula unilineata**, sp. nov.

Shell acuminate, turreted, subfusiform, rather slender, base contracted and slightly twisted, shining, brownish-lead color with a single spiral whitish line on the upper portion of the body; whorls 10, flatly convex, somewhat roundly shouldered; longitudinally ribbed, ribs not very prominent

nor closely-set, obsolete or nearly so on the last whorl; interstices with distant transverse linear grooves, most conspicuous on the upper whorls; aperture less than half the length of the shell; columella with four plaits.

Length 19 mill. (Mus. Godeffroy).

Hab. Viti Islands.

Appears to be rather scarce; only several dead specimens found on the sandy-mud flats at Kioa Island. It may easily be distinguished by its peculiar color and constant white line. The low distant ribs give the whorls a polygonal outline when seen from above.

145. **Turricula vittata** Swainson. Reeve, Conch. Icon., pl. vii., fig. 50a, 50b, 50c.

We were very fortunate in discovering five living examples of this superb species, which were found on sandy-mud bottoms in sheltered bays at Vanua Levu, Viti Islands.

Reeve's poor and indifferently colored figures give but a slight idea of the beauty of this scarce shell.

Our examples, the largest of which is $2\frac{1}{2}$ inches long, are of a rich orange-yellow or orange-red, encircled with a broad white zone, which sometimes carries a median narrow brown line. The lower portion of the body whorl has a second but smaller band of a pale yellow color. Both bands are edged with dark brown fillets, and the upper one occupies the lower half of each whorl of the spire. Aperture white, more or less stained with orange.

The upper portion of the body whorl is somewhat angulate and slightly concave above the angle.

146. **Turricula variata** Reeve, l. c., pl. xxvi., fig. 209.

Mitra fratercula Garr. Proc. Zool. Soc., 1872, p. 482.

This rare and pretty species, which is seldom found in good condition, occurs under dead coral on the outer reefs and ranges from the Paumotu to the Viti Islands.

The five examples now before me are shaped exactly like Reeve's figure and agree very well with his description. The upper portion of the whorls can scarcely be considered angulated as stated by the above author, but roundly shouldered the same as represented in his figure, which is quite distinct from the angle on *concinna* and *crocata* figured on the same plate.

The impressed striæ are not fine, but on the contrary are rather coarse, distant, and more like transverse linear punctures than striæ. The upper portion of the ribs are slightly noduled. The color is pale luteous or white, encircled by several chestnut-brown lines which are usually grouped in pairs.

My *fratercula* is undoubtedly the same as Reeve's species. The ribs are smaller, more numerous, and their upper portion is divided by an incised line, forming a row of yellowish nodules.

Animal light brown, freckled with yellowish-white.

147. **Turricula vulpecula** Linnæus. Reeve, l. c., pl. viii., fig. 55*a*, 55*b*, 55*c*.

We obtained a number of living examples of this handsome species by digging in sandy-mud, at low water mark in sheltered bays in the Viti Islands.

None of our specimens are so large as the Philippine shells figured by Reeve. The color is whitish-yellow or orange-yellow, with from one to three blackish-brown belts on the body whorl. Some of the specimens have the above colors and markings reversed, being of a dark brown or blackish-brown with yellowish or orange-yellow bands.

The animal is delicately mottled with purple-black, gray and white. The long siphon is blackish-violet, dotted with creamy-white.

148. **Turricula Zebuensis** Reeve (?), l. c., pl. x., fig. 73.

T. incisa Garr. MS.

A very rare Viti Island species, of which we found four examples (dead), on the Kioa shore reefs.

Having serious doubts of the correct determination of this species I have added the MS. name by which it has been known in my collection for the past several years. If really distinct from Reeve's shell, and cannot be referred to any described species my name can be retained. I add the following description.

Shell acuminate turreted, somewhat fusiform, rather thick, slightly shining, base contracted, somewhat produced; color creamy-yellow, variegated with different shades of ferruginous-brown disposed in a rude transverse band on the body whorl and irregularly tessellated above; whorls 10-11, convex, last one faintly angulate above; longitudinally ribbed, ribs small, numerous, convexly-angular, the same size as their interspaces, and the whole surface with rather close deeply incised spiral lines; aperture creamy-yellow with a faint pinky tinge in front, a little less than half the length of the shell; columella four plaited.

Length 27, diam. 9 mill. (Coll. Garrett).

Our shells though very nearly similar in shape are considerably smaller than Mr. Reeve's figure of a Philippine example. He describes the surface as being "*very finely cancellated with rather flat closely set ridges of which the longitudinal are the larger,*" which will scarcely apply to our shells, unless he considered the interspaces between the incised lines to be ridges.

149. *Turricula* sp.

A single dead specimen found on the Kioa reef, Viti Islands.

It is a small elongate-oval species, cancellated with

longitudinal and transverse ribs, and the whorls angulately shouldered. Color brownish with a white band beneath the suture.

Length 17 mill.

This and the following undetermined species are deposited in the Museum Godeffroy, Hamburg.

150. **Turricula** sp.

One example of this minute species occurred in beach sand at Anaa, Panmotu Islands.

It is closely allied to *T. rubra*, but differs in its more angulate ribs, less swollen whorls, coarser striæ and has no brownish spots or lines. The color is light pinky-red with a revolving white band.

Length 7 mill.

151. **Turricula** sp.

A few specimens were found buried in sand at low water mark at the Caroline Islands.

152. **Turricula** sp.

Three examples found in beach sand at the Panmotu Islands.

153. **Turricula** sp.

One specimen obtained on the shore reef at Kioa, Viti Islands.

154. **Turricula** sp.

Five specimens obtained from beach sand at Anaa, Panmotu Islands.

155. **Turricula** sp.

Two examples found on the Kioa reef, Viti Islands.

156. **Turricula** sp.

A single weathered example found in shallow water at the same locality as the preceding.

Genus CYLINDRA Schum.

157. **Cylindra nucea** Gronovius. Reeve, Conch. Icon., pl. xii., fig. 86.

Excepting the Marquesas, we obtained this somewhat rare species at all the South Sea groups. The habitat "New Zealand" usually assigned to this species is undoubtedly wrong.

Our examples, which are smaller than Reeve's figure, are white, with or without transverse rows of small brownish dots, and when in good condition are invested with a very thin translucent tawny-yellow epidermis, which is more or less stained with brown-black.

The animal is diluted white; the foot and siphon margined with dashes of black and white.

158. **Cylindra dactylus** Linnæus. Reeve, l. c., pl. xii., fig. 88.

Occurs in the same station as the preceding species—that is, in sand or sandy-mud inside the reefs. They were obtained at all the groups except at Cook's Island. It appears to be scarce everywhere.

Our largest examples, which were found at the Viti Islands, are larger than Mr. Reeve's excellent figure of a Philippine specimen.

159. **Cylindra crenulata** Lamarck. Reeve, l. c., pl. xxiv., fig. 190a.

Found in the same station, and is as widely diffused as the preceding species. It is rather a scarce shell at all the groups.

Our largest Viti example, which is nearly two inches long, is considerably larger than Reeve's figure.

160. **Cylindra fenestrata** Lamarck. Reeve, l. c., pl. xxiv., fig. 189.

A common Society Island species found buried in sand in shallow water inside the reefs, and *not* under stones as stated by Reeve. It is very rarely found at the Paumotu and Viti groups, and has been recorded from the Pelew and Caroline Islands. u

The three Viti examples which I obtained are much smaller and more slender than Eastern shells, and are nearly a uniform white color. Mr. Reeve's figure is colored pale bluish-green, though he very correctly describes the ground color as whitish. The transverse lines are brownish or jet-black. The columella is eight-plaited—not nine-plaited as stated by Mr. Reeve.

Genus IMBRICARIA Schumacher.

161. *Imbricaria Olivæformis* Swainson. Reeve, l. c., pl. xxvii., fig. 212.

We found this species inhabiting all the groups except the Marquesas, Cook's and Tonga Islands. It appears to be rather scarce everywhere except the Society Islands, where it is very abundant and gregarious in sand inside the reefs.

It appears to be an aberrant form intermediate between *Cylindra* and *Imbricaria*, and might with equal propriety be referred to either genus, though it is usually placed in the latter. Mr. Swainson considered it to be a *Mitrella* (= *Swainsonia*), the type of which is *Mitra fasciata*. It attains a larger size than represented by Reeve's figure. The color is ivory-white, under a very delicate luteous epidermis. The punctured spiral lines are confined to the upper portion of the shell.

The animal is creamy-white, with a cream-yellow creeping disk.

162. *Imbricaria conica* Schumacher. Reeve, l. c., pl. xxvii., fig. 216.

This species, which appears to be confined to the islands south of the Equator, was obtained at all the groups except Tonga and the Marquesas. They occur in sand in sheltered places inside the reefs, and are gregarious. During two years exploration in various parts of the Viti Islands, I found only one large colony in a small patch of sand in the Kioa shore reef.

163. *Imbricaria punctata* Swainson.

Mitra ossea Reeve, l. c., pl. xxvii., fig. 219.

Not very plentiful and ranges through all the groups south of the Equator. Station the same as the preceding species.

It will be observed that I have restored Swainson's name, which has precedence over Reeve's *ossea*.

164. *Imbricaria virgo* Swainson. Reeve, l. c., pl. xxvii., fig. 214.

Found (rarely) in all parts of Polynesia, except the Marquesas. Lives in sand at low water mark. The coloration is the same as *Olivæformis*.

165. *Imbricaria Vanicorensis* Quoy & Gaimard. Reeve, l. c., pl. xxvii., fig. 220.

Somewhat rare and only occurred to our notice at the Viti Islands, where they were found in sandy-mud near low water mark.

The spire and upper part of the body whorl is ashy-grey, and the lower parts brownish-grey, and everywhere dotted with flake-white and brown.

Genus MITROIDEA Pease.

Proc. Zool. Soc., 1865. p. 514.

Mauritia, A. Adams, Proc. Zool. Soc., 1869, p. 273.

This genus was established by Mr. Pease for a singular species of *Mitridæ* shaped like *Dibaphus*, Phil., but has the spire much more produced and the columella with numerous small slightly oblique plaits.

166. *Mitroidea multiplicata* Pease. Proc. Zool. Soc., 1865, p. 514.

This species, which appears to be very scarce, was obtained at the Panmotu and Samoa Islands. A single example was found at each of the above groups. The Panmotu shell, which was living when found, occurred under a large block of dead coral on the shore margin of the outer reef at Makaimo, one of the large windward islands.

The Samoa specimen, which is larger than the former, was obtained in a dead condition, but very perfect, on the outer reef at Upolu. Mr. Pease's type was taken at one of the guano islands in Central Pacific.

Our shells are pure white, with distant, transverse, hair-like brownish-yellow, slightly impressed lines, under a smooth, shining, luteous epidermis. The whole surface is striated with very fine transverse impressed lines, which are most conspicuous towards the acute apex. The narrow, contracted aperture occupies three-fifths of the length of the shell, and the columella exhibits 9—10 small plaits. The thick smooth outer lip is slightly involute. The outlines of the spire are flatly convex, and the whorls nearly plain. The body whorl is slightly convex, and the base is truncate and deeply notched.

Length 30, diam. 12 mill.

Genus DIBAPHUS Philippi.

Arch. Wieg., 1847, p. 61.

The close resemblance of this remarkable shell to certain species of *Conus*, particularly *C. mitratus*, (which is also

nearly the same color), and more distantly allied in shape to *Strombus terebellatus*, has induced our most eminent authorities on classification to assign it a position intermediate between the above two genera.

It is surprising when Mr. Pease published his genus *Mitroidea*, he should have failed to allude to its very near relationship to *Dibaphus*. The only difference between the two genera consists in the former having several small columellar plaits, whilst in the latter the anterior half of the columella is simply roughened by a continuation of the small elevated transverse ridges which mark the external surface of the shell.

That portion of the pillar-lip immediately above the prolonged ridges, is, as in all *Mitridæ*, perfectly smooth, so that they may be considered rudimentary plaits. In every other particular, as regards detail of structure, the two genera are precisely alike, with the exception of *Mitroidea* having a more produced spire and a smooth shell.

The animal as stated in my paper on *Mitridæ*, published in the Pro. Zool. Society for 1872, has the external structure of a *Cylindra*, which is widely different from that of a *Conus* or *Strombus*.

167. **Dibaphus Philippii** Crosse.

Conohelix edentula, Swainson, MS.

Conus edentulus, Reeve. Conch. Icon., *Mitra*, pl. xi., fig. 80.

Dibaphus edentulus, Philippi, Arch. Weig., 1847, p. 61, pl. iii., fig. 1—3.—Chenu, Man. Conch., vol. 1, fig. 1569.—Garr. P. Z. S., 1872, p. 843.

Dibaphus Philippii, Crosse, Rev. Zool., 1858, p. 4, pl. iii., fig. 1.—Pease, Jour. Conch., 1871, p. 98.

This singular shell, which appears to be rare, was obtained at all the groups south of the Equator, except the

Tonga and Marquesas Islands. They were found lurking beneath dead coral on the outer reefs. M. Crosse records it from the Marquesas and New Caledonia. Mr. Pease obtained two examples from the Caroline Islands, and M. Paetel records it from the Philippines. My largest specimen was taken at one of the guano islands in Central Pacific.

The ground color is whitish more or less stained with yellowish-brown, and ornamented with two transverse rows of large, irregular, reddish-brown spots which are frequently confluent. The whole surface is roughened by small, transverse, angular ridges, which are about the same size as their interspaces, which latter are longitudinally elevated lines. The ridges on the basal portion, which are more oblique than those above, wind round the pillar-lip so that they resemble rudimentary plaits. The resemblance is the more obvious in consequence of the lip being perfectly smooth on the upper portion.

M. Crosse, who has published an accurate and interesting history of this shell illustrated with two good figures, has changed Swainson's MS. name *edentulus* to *Philippi*, which latter must I presume be adopted in preference to the former negative denomination.

The following species, not found by the writer, are recorded from the Polynesian Islands :—

1. *Mitra limbifera* Lam. Reeve, Conch. Icon., pl. xxiii., fig. 180. Marquesas Islands (Paetel).
2. *Mitra ordinata* Pease (Ubi). Sandwich Islands (Paetel).
3. *Mitra crassa* Swain. Reeve, l. c., pl. ii., fig. 7. Tonga (Græffe).
4. *Mitra catenata* Swain. Reeve, l. c., pl. xxxii., fig. 259. Panmotu Islands (Cuming).

5. **Mitra encausta** Gould. Ex. Ex. Shells, p. 274, fig. 356. Viti Islands (Gould).
6. **Mitra pudica** Pease. P.Z.S., 1860, p. 146. Sandwich Islands (Pease) = *M. nux-avellana* Dohrn. (Pease).
7. **Mitra Samuelis** Dohrn. P. Z. S., 1860, p. 368. Sandwich Islands.

Mr. Pease refers this with a doubt to *M. astricta* Rve.

8. **Mitra sectilis** Pease. Amer. Jour. Conch., 1867, pl. xxiii., fig. 2. Caroline Islands (Pease).
9. **Mitra saltata** Pease (Thala). Amer. Jour. Conch., 1867, p. 216.
10. **Mitra lubrica** Pease, l. c., p. 272, pl. xxiii., fig. 2. Caroline Islands (Pease).

Mr. Pease described this species under the name of *glabra* (not of Swainson), and subsequently changed it as above.

11. **Mitra fulvenscens** Swain. Reeve, Conch. Icon., pl. xxxi., fig. 255. Panmotu Islands (Cuming).
12. **Mitra nigra** Chem. Reeve, l. c., pl. v., fig. 33. Panmotu Islands (Cuming).
13. **Mitra approximata** Pease (Ubi). Sandwich Islands (Pease).
14. **Mitra infecta** Reeve, l. c., pl. xi., fig. 75. Panmotu Islands (Cuming).
15. **Mitra circulata** Kien. Reeve, l. c., pl. xi., fig. 77. Viti Islands (Græffe).
16. **Strigatella decurtata** Reeve, l. c., pl. xx., fig. 154. Samoa Islands (Græffe).
17. **Strigatella nigricans** Pease. Amer. Jour. Conch., 1867, p. 215. Caroline or one of the guano islands in Central Pacific.
18. **Turricula Wisemanni** Dohrn. P. Z. S., 1860, p. 367. Sandwich Islands (Dohrn).

Mr. Pease considered it to = *T. bella*. Von Paetel

catalogues it as distinct from the latter species.

19. *Turricula armillata* Reeve. Conch. Icon., pl. xxxvii., fig. 315. Panmotu Islands (Cuming).
20. *Turricula catenata* Swain. Reeve, l. c., pl. xxxii., fig. 259. Panmotu Islands (Cuming),
21. *Turricula elegans* Reeve, l. c., pl. xxix., fig. 233. Viti Islands (Gould).
22. *Turricula elegantula* Dunker. Malak. Blat., 1871, p. 154. Samoa Islands (Græffe).
23. *Turricula pupula* Dkr. Cat. Mus. Godeffroy, No 4, p. 84 (name only). Samoa Islands (Græffe).
24. *Turricula aureolata* Swain. MS. Reeve, Conch. Icon., pl. xxvi., fig. 210. Samoa Islands (Græffe).
25. *Turricula venustula* Reeve, l. c., pl. xxvi., fig. 204. Caroline Islands (Schmeltz).
28. *Turricula modesta* Pease (not of Reeve). Amer. Jour. Conch., 1867, p. 202, pl. xv. Caroline Islands (Pease).
Very closely related to *T. Grunerii* Rve.
29. *Cylindra formosa* Pse. Amer. Jour. Conch., 1867, p. 271, pl. xxiii., fig. 1. Caroline Islands (Pease).

RECAPITULATION.

Viti Islands	...	...	120 species
Tonga Islands	...	...	48 "
Samoa "	...	...	76 "
Kingsmill Islands	...	...	43 "
Caroline "	...	...	44 "
Cook's "	...	...	41 "
Society "	...	...	64 "
Panmotu "	...	...	81 "
Marquesas "	...	...	7 "
Sandwich "	...	...	36 "

Western Polynesia yields 145 and Eastern Polynesia 112 species.

On summing up the stations of the various *Mitres*, it is interesting to note that all the species embraced in each section or sub-genus inhabit similar stations.

All the typical *Mitræ* as restricted; together with the subgenera *Scabricula*, *Cancilla* and probably *Mutyca* are sand or burrowing species.

All the species of *Nebularia*, *Chrysame*, *Thala*, and *Voluto-mitra* are reef shells.

The sub-genus *Zeba* are probably sand *Mitras*.

All the species of *Zierlina* are littoral shells.

The *Strigatella* are all reef species.

All the typical *Turricula*, *Costellaria* and *Callithea* are sand species, and all the species of *Pusia* are reef shells.

The *Cylindra* and *Imbricaria* are sand species, and the *Dibaphus* and *Mitroidea* are reef shells.

October, 1879.



HELIX VIRGATA MONST. *SINISTRORSA*, AND *H. CA-
PERATA* VAR. *ALBIDA*, NEAR YARMOUTH, ISLE OF
WIGHT.

By C. ASHFORD.

I lately took a perfect shell of this form, which is rather rare, from the roadside hedge near Afton toll-gate. It is of the common uniform brownish-yellow color. The briefest examination of the apex shows that it *began* wrong in ovo, and was not perverted during infancy by external conditions. Near the same spot I also found a beautiful albino of *H. caperata*, the mollusk as well as its shell being white. It belongs to the mottled or freckled variety of that species, the transverse streaks of color being replaced by translucent patches.

HELIX ASPERSA MONST. *SINISTROSA* AT REDCAR.

BY W. C. HEY, M.A.

Under a broken crock, lying on a sand hill at Redcar, I discovered (among some twenty dextral specimens,) a single sinistral example of *Helix aspersa*. It is a well-formed shell, almost adult, and I am still keeping it alive.

March, 1880.

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Testacella Maugei in Jersey.—Correction of name—not *T. haliotoidea* as in Sci. Gossip for July 1879. M. M. Bull, Sci. Gossip, April 1879, p. 90.

The Mollusca of the Firth of Clyde; being a Catalogue of Recent Marine Species found in that Estuary.
By Alfred Brown. (Glasgow: Hugh Hopkins, 1878.)

Although the recent mollusca of this district have during the last few years received a good deal of attention, especially from the labours of M'Andrew, Barlee, and Merle Norman, still the various memoirs detailing the results of these labours were only to be found widely scattered through a number of scientific periodicals, and Mr. Brown has in this neatly printed work given us not only a *résumé* of the labours of the naturalists we have referred to, but also of all those who have collected on the Firth of Clyde, and joined these to the labors of Mr. David Robertson and his own. The result is, so far as the testaceous mollusca go, a large and apparently accurate catalogue, which will show not only what has been done but also among the nudibranchs and cuttle-fish

what is yet to be done. The notes under the heading of Habitat in this catalogue are often most interesting, giving details not only of the exact localities for the species, but notes also of their local names.

Brazier (John, C.M.Z.S.)—**Description of a New species of Vivipara.**—Proc. Linn. Soc., New South Wales 1879, iii., 221 and 222.

V. Alisoni, from Diamantina River, Queensland.

Brooks (Prof. W. K.)—**Amphioxus and Lingula at the mouth of Chesapeake Bay.**—Amer. Nat., Jan. 1879, xiii. 45.

Embryological note.

Call (P. Ellsworth.)—**Synonymous Unios.**—Amer. Nat., June 1879, xiii., 392 and 393.

Notes on *U. nasutus* Say, *U. Nashvillensis* Lea, *U. Mississippiensis* Conr., *U. subrostratus* Say. The three last names appertain to one species, Say's name having priority. It is often erroneously named by collectors as *U. nasutus*.

Dercum (Francis, M.D., Ph.D.)—**The Sensory Organs.—Suggestions with a view to generalization.**—Amer. Nat. Sept. 1878, vol. xii., 579 to 593.

This paper though mainly relating to vertebrate animals includes a discussion at p. 591 on the structure and development of the eyes of cephalopods.

Dietl (M. J.)—**Researches on the Organization of the Brain of Invertebrate animals.**—Parts I and II (Cephalopoda, Tethys, Crustacea).—Sitzungsberichte d. k. ak. d. Wissenschaften, section I, Mathematics and Natural Science, vol. lxxvii., part 5, May 1878. 10 plates.

Doring (Dr. A.)—**Systematic and Anatomical Studies of the Pulmoniferous mollusca of the Plata.**—Estudios

sistematicos y anatomicos sobre los Países del Plata.—*Periodico Zoologico*, organo de la Sociedad Zoologica Argentina, publicado por la misma—Tomo I., Entr. III. Buenos Ayres, 1875.

Doring (Dr. A.)—The Molluscan Fauna of the Argentine Republic.—Aprintes sobre la fauna de moluscos de la Republica Argentina.—Tercera Parte, Cordoba 1876.

Durnford (W.A.)—Destruction of Shell-fish by Sea Birds.—*Zool.*, June 1878, third series, ii., p. 223 to 225.

The great diminution in the numbers of cockles and mussels in Morecambe Bay and the estuary of the Duddon is attributed to the depredations of sea-fowl, which have increased much since they were protected by Act of Parliament. Mr. Durnford points out that thirty years ago both birds and shell-fish were far more abundant than now; and he thinks it more likely that the abnormal growth of the population of Furness and Barrow has upset the whole balance of animal life.

Fredericq (M.L.)—On Hæmacyanine, a new substance from the Blood of the Poulp (*Octopus vulgaris*).—*Comptes Rendus*, (French Academy) Dec. 16, 1878, lxxxvii, No. 25.

Fredericq (M.L.)—On the Chromatic Function in the Poulp.—*Comptes Rendus*, lxxxvii, No. 26, December 23rd, 1878.

Geddes (Patrick.)—On the Mechanism of the Odontophore in certain Mollusca.—*Trans. Zool. Soc.*, part 11, 3 plates.

Paulucci (Marchesa Marianna) Some new Italian Species of Pomatias.—*Fauna Italiana Comunicazioni Malacologiche*, Articolo secondo. Descrizione di alcune Nuove Specie del genere Pomatias.—*Bull. Soc. Mal. Ital.*, 1879, vol. v., p. 13 to 21.

P. elongatus Paulucci, Province of Lucca, *P. elegantissimus* Paulucci, Province of Lucca, *P. turricula* Paulucci, Province of Lucca, *P. Crosseanus* Paulucci, Province of Lucca, *P. Allerianus* Paulucci, Sicily, *P. Pirajni* Benoit, Isle of Fairgnana, *P. Adamii* Paulucci, *P. Scalarinus* Adami, Calabria, *P. Fischerianus* Paulucci, Sicily, *P. Dionysi* Paulucci, Syracuse, *P. Westerlundi* Paulucci, Calabria, *P. agriotes* Westerlund, Umbria, and *P. Sospes* Westerlund, Province of Lucca, are described.

Paulucci (Marchesa Marianna).—**Conchology at the Paris Exhibition 1878.**—L'Esposizione universale del 1878 considerate dal lato conchiologico.—Bull. Soc. Mal. Ital. 1879, vol. v., p. 5 to 10.

An interesting account of the conchological exhibitions of various nations.

Parsons (H. Franklin, M.D., F.G.S.).—**Mollusca of Neighbourhood of Hull.**—Hobkirk and Porritt's Naturalist, Jan. 1879, vol. iv., p. 90.

Supplementary to Mr. Butterell's Catalogue published in the same Journal for 1878. Species of *Ancylus*, *Vertigo*, *Helix*, *Conovulus*, *Telina Unio*, *Sphærium* and *Paludina* are referred to.

Weatherby (A.G.).—**Margaritana dehiscens** Say.—Amer. Nat., April 1878, vol. xii., 254.
A note on its generic position.

Weatherby (A. G.).—**On Texan Streptomatidæ.**—Amer. Nat., April 1878, vol. xii., p. 254.

Notes on *Melania pleuristriata* Say, *Holospira roemeri* Pfr. A closely allied species or a very persistent variety of *M. pleuristriata* is indicated under the name of *marmocki*. All collected in Bexar County.

Weatherby (A.G.).—**Helix Chilhoweensis** Lewis.—Amer. Nat., vol. xii., p. 390 to 392.

The author objects to Binney's view that this is merely a

variety of Say's *H. diodonta* ; describes the animal, its habits and distribution. During the excursions to the highlands of Kentucky and Tennessee which produced this shell were also collected other species including the rare *H. Wetherbyi* Bland.

White (C.A., M.D.)—Descriptions of new species of invertebrate Fossils from the Carboniferous and Upper Silurian rocks of Illinois and Indiana.

Proc. Acad. Nat. Sci. Philad., 1878, pp. 29 to 37.

The new mollusca are *Ptilodyclia triangulata* (Polyzoon) *Astartella Gurleyi* and *Nautilus Danvillensis*, all from the coal-measure strata, Danville, Illinois.

White (F. Buchanan, M.D., F.L.S.)—Mollusca of Glen Tilt, Scotland.—Scot. Nat., April 1878, vol. iv., pp. 246 to 248.

The interesting feature of the mollusca is the variation of their distribution within the glen, owing to its varying geological structure. *Helix fusca* is abundant. The other species mentioned are *H. arbustorum*, and var. *alpestris*, *H. nemoralis*, *H. hortensis*, *H. rotundata*, *H. concinna*, *Zonites crystallinus*, *Z. nitidus*, *Z. alliarius*, *Vitrina pellucida*, *Limnæa truncatula*, *Bulimus obscurus*, *Clausilia perversa* and var *Everettii*, *Carychium minimum* and *Arion ater*.

Wood (James W.)—Conchological Notes : Switzerland, 1877.—Hobkirk and Porritt's Nat., March 1878, vol. iii., pp. 113 and 114.

In this paper, which was originally read before the Conchological Society, Mr. Wood discourses on the shells which occurred to him at the Lake of Lucerne, Interlaken, and Neuchâtel.

Woods (Rev. J. E. Tenison, F.G.S., F.L.S.)—On some new Marine Mollusca.—Trans. and Proc. Roy. Soc. Victoria, vol. xiv. (issued July 11th, 1878.)

Woods (Rev. J. E. Tenison, F.G.S.)—**On an Australian variety of *Neritina pulligera* L.**—Proc. Linn. Soc. New South Wales, 1878, vol. iii., p. 3 to 6.

Variety *sulcata*, from Northern Queensland.

Mr. Wood also describes a new species of *Melania*—*oncoides*—common in the creeks near Bourke, Darling River.

Woods (Rev. J. E. Tenison, F.G.S.)—**On some new Marine Shells [dredged off Port Jackson Heads, Australia.]**—Proc. Linn. Soc. New South Wales, 1878, vol. ii., p. 262 to 266.

The shells were dredged at a depth of 45 fathoms by Mr. John Brazier. The names are—*Terebra lauretanæ*, *Turritella incisa*, *Cingulina torcularis*, *Natica subcostata*, *Raulinia badia* (remarks on the genus), *Drillia tricarinata*, *Rissoina cretacea*, and *R. cylindracea*.

Woods (Rev. J. E. Tenison, F.G.S.)—**On some Tertiary Fossils from New Guinea.**—Proc. Linn. Soc. New South Wales, 1878, vol. ii., p. 267 to 268.

Pecten Novæguinæ is described as new, and *Dolium costatum* Desh. is recorded.

Woods (Rev. J. E. Tenison, F.G.S.)—**On *Bulimus Dufrenoyi*.**—Proc. Linn. Soc. New South Wales, 1878, vol. iii., p. 81 to 91, and plate 7.

The purport of this paper is to shew that the work of cataloguing and describing the Australian mollusca has now proceeded so far as to open the way to the careful study of the variations to which the species are subject. With this object in view, the variations of *Bulimus Dufrenoyi* are studied in detail and several of them figured.

Woods (Rev. J. E. Tenison, F.G.S.)—**On some Australian Littorinidæ.**—Proc. Linn. Soc. New South Wales, 1878, vol. iii., pp. 55 to 72.

After a lengthy discussion of the various genera and their value, the author concludes: first, that the *Littorinidæ* of Australia so closely resemble the genus *Littorina* of Europe that they cannot be generically separated from it. Second, that the genus *Risella* should be suppressed, as no permanent generic character can be defined in it, and there is only one species, which is extremely variable. Third, that the species known to some authors as *Tectaria pyramidalis* is merely *Littorina* with a double line of granules, which feature does not entitle it to generic distinction, since it shows it with many other species. If it be considered that it is destitute of many of the defined characters of *Tectaria*. Fourth, that the Australian *Littorina Mauritiana* is probably identical with the European *L. cærulescens*, and that *L. ziczac*, *L. unifasciata* and *undulata* are merely varieties. Fifth, that all the Australian species have in the anterior aperture a groove or line, often conspicuously light in color, which is in some way connected with the organs of reproduction.

Woods (Rev. J. E. Tenison, F.G.S.)—**On some Australian Shells described by Dr. A. Gould.**—Proc. Linn. Soc. New South Wales, 1878, vol. ii., p. 250 to 261.

In this paper Mr. Woods reprints from the Proc. Bost. Soc. Nat. Hist., vol. ii., iii., vii. and viii. The species are *Chiton quercinus*, *C. jugosis*, *C. fruticosus*, *C. platessa*, *C. incanus*, *Patella cinnamomea*, *Haliotis crispata*, all from New South Wales; *Amnicola badia* and *A. egenea* from Bank's Peninsula, New Zealand; *Trochus sirijs* (=young form of *Carinidea squamifera* according to Mr. Woods) New Holland; *Psammobia florida*, Illawara, N. S. Wales; *Cyclas egregia*, N. S. Wales; *Cyrena debilis*, New Holland?; *Tornatina apicina*, Sydney; *Cylichna regularis*, Sydney (= *C. arachis* Quoy and Gaim., according to Mr. Woods); *Emarginula (Clypidina) radiata*, Sydney (Mr. Woods doubts if this is distinct from *E. australis* Lam.); *Ringicula denticulata*,

Port Jackson, N.S.W.; *Nassaria curta*, Port Jackson; *Nassa reposta*, Sydney; *N. optata*, Sydney; *Clathurella peregrina*, Sydney; *Cerithium lacertinum*, Sydney; *Rissoina flexuosa*, Sydney; *Chemnitzia circumdata*, Sydney; *Monilea apicina*, Port Jackson; *Clanculus jucundus*, Sydney; *Elenchus ocellatus*, Sydney; *E. exiguus*, Port Jackson; *Cantharidus lineolaris*, Sydney; *Thracia cultrata*, Port Jackson; *Lepton concentricum*, Sydney; *Kellia Balaustina*, Sydney; *Modiolaria varicosa*, Sydney; *Emarginula aspera*, Sydney; and *E. ossea*, Fiji. Numerous remarks are interjected by Mr. Woods.

Woods (Rev. J. E. Tenison, F.G.S.)—**On some freshwater shells from New Zealand.**—Proc. Linn. Soc. New South Wales, 1878, vol. iii., pp. 135 to 139 and plate 13.

Mr Woods quotes the conclusions of M. Fischer as given in the Journal de Conchyliologie for April, 1878, and describes two new *Physæ*—*P. Guyonensis* and *P. lirata*. He also recapitulates the list of known *Physæ* from New Zealand, and includes remarks on *Bythinella coralla* Gould, and its allies.

Woods (Rev. J. E. Tenison, F.G.S.)—**Two new species of Land Shells.**—Proc. Linn. Soc. New South Wales, 1878, vol. iii., pp. 123 to 126 and plate 12.

Helicarion fumosa from Tasmania, allied to *H. atramentaria* of Dandenong Ranges, Victoria; and *Helix mucoides*, Victoria, allied closely to *H. mucosa* Cox, of New South Wales.

Angas (G. French).—**Descriptions of 10 new shells of the genera Axinæa and Pectunculus.**—P. Z. S., May 6, 1879.

Daniel (John E.)—**Pearls in Pecten maximus.**—Science, Gossip, July, 1879. p. 161.

Dubreuil (E.)—Catalogue of land and freshwater mollusks of the department Herault.—*Revue des Sciences Naturelles*, 2nd series, vol. i., No. 1.

Hesse (P.)—On the mollusk-fauna of Westphalia.—*Nature*, Aug. 7, 1879.

Folin (Marquis de).—Distinctive characters of *Acme Dupuyi*, *A. polita* and *A. cryptomena*.—*Comptes Rendus*, Soc. Linn. Bordeaux, 1878, vol. xxxii., p. cxviii.

Marquand (E. D.)—The New Forest.—*Sci. Gos.*, June, 1879, p. 125.

Clausilia dubia; *Helicella excavata*, common; *H. fulva*; *Planorbis contortus*, abundant; *Pisidium pusillum*, *Carychium minimum*, numerous in company.

Jourdain (M. S.)—On the termination of the Visceral Arterioles of *Arion rufus*.—*Comptes Rendus*, lxxxviii., No. 4, Jan. 27, 1879.

Gough (Thos.)—Vital tenacity of *Succinea putris*.—*Zool.*, Feb., 1879, 3rd series, vol. iii., p. 62.

Kerguelen and Rodriguez.—The Reports of the Transit of Venus Expedition.—Published as an extra volume of *Philosoph. Trans.*, June, 1879.

Joliet (M. L.)—On the presence of a Segmentary Organ in Endoproct Bryozoa.—*Comptes Rendus*, vol. lxxxviii., No. 8, Feb. 24, 1879.

Stefani (Dott. Carlo de) and Pantanelli (Dott. Dante).—A New Italian Daudebardia.—*Di una nuova Daudebardia Italiana.*—*Bull. Soc. Mal. Ital.*, 1879, vol. v., pp. 11 to 12.

D. tarentina, from the hills near Taranto. For its recep-

tion Signor de Stefani proposes and characterizes a new subgenus, *Pseudolibania*.

Stefani (Dott. Carlo de).—**New Central Italian Recent Mollusca**.—Nuove specie di Molluschi viventi nell'Italia Centrale.—Bull. Soc. Mal. Ital., 1879, vol. v., pp. 38 to 48.

Hyalina scotophila De Stef.=*H. aquitanica* (non Charp.) Bonelli and Martens, Siena; *H. Vallisnerii* De Stef.=*H. aculeata* (non Müller) De Stef. 1875, Val di Serchio; *H. Pantanellii*=*H. strigella* (non Drap.) Pantanelli, Spoleto; *Clausilia Delpretiana* De Stef.=*C. cruciata* (non Stud.) Gentiluomo=*C. parvula* (non Stud.) Bonelli and Martens=*C. rugosa* (non Drap.) var. *crenulata* (non Risso) Strobel, various Italian localities; *C. Pecchiolii* De Stef.=*C. rugosa* (non Drap.) Issel=*C. crenulata* (non Risso var. *minor* Bonelli, De Stef. &c.=*parvula* (non Stud.) Paulucci=*rugosa* (non Drap.) var. *minor* Paulucci=*rugosa*, var. *crenulata*, *minor* Strobel, various Italian localities; *Belgrandia Bonelliana* De Stef., near Siena; and *Pomatias Gualfinensis* De Stef.=*P. patulum* (non Drap.) De Stef., province of Massa.

Watson (Rev. R. B.).—**4th Contribution to Mollusca of Challenger Expedition (Trochidæ and Turbinidæ)**.—Linn. Soc., June 5, 1879.

Miller and Sketchly.—**Subfossil land and freshwater mollusca of Fenland** (60 sp.) p. 323; **Marine** p. 322 (60 sp.) 1878.

Pollard (Henry).—**Conchological Notes**.—Hobkirk and Porritt's Naturalist, June. 1879, vol. iv., p. 170.

Notices of the occurrence near Leeds of *Zonites glaber*, *Clausilia laminata* var. *albida*, also the type, *C. rugosa* var. *tumidula* and *Helix hispida* var. *albida*.

Studer (Prof. Dr. Th.).—Contributions to the knowledge of the Lower Animals of Kerguelensland.—Archiv für Naturgesch., 45th year, vol. i., part. i., 1 plate.

The Fauna of Kerguelensland: list of the species hitherto observed, with short notices on their appearance and their Zoogeographical relation.

Troschel (—).—Report on researches on the Natural History of Mollusca during the year 1877.—Archiv. für Naturg., 44th year, vol. ii., part 4.

Valentini (Eugenio).—Shell-bearing mollusca of the basin of the Tronto, Italy.—Molluschi conchigliiferi viventi del Bacino del Tronto.—Bull. Soc. Mal. Ital., 1879, vol. v., pp. 22 to 37.

The author enumerates a *Glandina*, 2 *Hyalina*, 26 *Helix*, 3 *Buliminus*, 2 *Cionella*, 1 *Stenogyra*, 4 *Pupa*, 10 *Clausilia*, 2 *Succinea*, 2 *Lymnæa*, 1 *Cyclostoma*, 2 *Bythinia*, a *Hydrobia* and a *Pisidium*—altogether 58 species.

Warren (Amy).—Land and Freshwater Mollusca of Mayo and Sligo.—Zool., Jan., 1879, 3rd series, vol. iii., pp. 25 to 29.

Two *Arion*, 5 *Limax*, 1 *Succinea*, 1 *Vitrina*, 6 *Zonites*, 13 *Helix*, 1 *Bulimus*, 3 *Pupa*, 5 *Vertigo*, 1 *Balia*, 1 *Clausilia*, 1 *Cochlicopa*, 1 *Carychium*, 1 *Sphærium*, 4 *Pisidium*, 1 *Unio*, 1 *Anodon*, 1 *Neritina*, 1 *Bythinia*, 2 *Valvata*, 5 *Planorbis*, 2 *Physa*, 4 *Limnæa* and 1 *Ancylus*.

Ward (James).—Vitality of the Common Snail.—Nature, Aug. 14, 1879, vol. xx., p. 363.

Helix aspersa lived nearly a year in a closed flower-pot.

Watson (Rev. R. Boog).—**Mollusca of Challenger Expedition.**—Part IV., Linn. Soc., June 4, 1879.

Angas (G. French).—**Account of the land shells collected by the late W. M. Gabb in Costa Rica.**—Zool. Soc., June 3, 1879.

G. French Angas gave an account of the land shells collected by the late W. M. Gabb in Costa Rica. The collection contained examples of 42 species, of which 10 or 12 are believed to be new to science.

Haernes (R) and **Aninger** (M)—**Die Gastropoden der Meeres-Ablagerungen der 1 & 2 miocänen Mediterran-Stufe in der österreichisch-ungarischen Monarchie.**—I. Wien.

Locard (A).—**Description de la faune malacologique des terrains quaternaires des environs de Lyon.**—Basel: Georg.

Woods (Rev. J. E. Tenison, F.G.S.)—**On some Tertiary Fossils from Muddy Creek, Western Victoria.**—Proc. Linn. Soc. New South Wales, 1879, vol. iii., pp. 222 to 240 and plates 20 and 21.

Triton Prattii, *Pisania tenuicostata*, *Fusus funiculatus*, *Pleurotoma Samuelli*, *Daphnella gracillima*, *Pleurotoma murndaliana*, *Mangelia bidens*, *Drillia Trevori*, *Conus Ralphii*, *Natica Wintlei*, var. *Hamiltonensis*, *Ancillaria semilævis*, *Nassa Tatei*, *Cancellaria varicifera*, *Cerithium cribarioides*, *C. apheles*, *Triforis Wilkinsoni*, *T. sulcata*, *Turritella transenna*, *T. platyspira*, *Thalotia exigua*, *Minolia strigata*, *Liotia lamellosa*?, *Solarium acutum*, *S. Wannonsensis*, *Adeorbis aster*, *A. acuticarinata*, *Trochita turbinata*, *Tornatina involuta*, *Leda inconspicua* Reeve, *L. Huttonii*, are described figured or mentioned.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

 1879.

52nd Meeting.

Meeting held at Leopold Square, Leeds, the President in the chair.

NEW MEMBER.

Mr. W. F. Petterd, C.M.Z.S., &c., of Launceston, Tasmania, was nominated for membership.

ANNUAL REPORT.

The Third Annual Report of the Society was read by the Secretary. The session just closed has not been an eventful one, but the progress of the Society has been steady and the interest of its meetings well sustained.

NEW MEMBERS.

Five new members have been elected since last Annual Meeting, viz. :—Mr. J. D. Butterell of Hull, Mr. Henry Laver, F.L.S., of Colchester, Mr. John Brazier, C.M.Z.S., &c., of Sydney, Rev. Herbert Milnes, M.A., of Winster Vicarage, Derby, and Mr. J. W. Cundall of Bristol.

LIBRARY.

The additions to the Society's Library have been important and are as follows :—

Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft
 —Elfter Jahrgang. [Mr. R. Scharff.
 Illustriertes Conchylienbuch, herausgegeben von Dr. W. Kobelt,
 vierte, funfte sechste lieferungen. [Dr. Kobelt.

Synopsis novorum generum, specierum et varietatum molluscorum viventium testaceorum anno 1877 promulgatorum (exclusis generibus Heliceorum, Auriculaceorum et pneumonopomorum) collegit Dr. W. Kobelt. [Dr. Kobelt.

The Mollusca of the Fiords near Bergen, Norway, by Rev. A. M. Norman, M.A. [Mr. J. W. Taylor.

Synonymy of and remarks upon Tasmanian and other shells, with their geographical distribution, by John Brazier.

[Mr. John Brazier, C.M.Z.S., &c.

Die geographische Verbreitung der Binnen-mollusken, by Dr. W. Kobelt. [Dr. W. Kobelt.

Bulletin of Museum of Comparative Zoology, vol. v., Nos. 8 and 9 (Reports on Dredging operations of the U. S. Coast Survey Steamer "Blake"). [Prof. Agassiz.

Monograph of Tasmanian Land Shells, by W. F. Petterd of Launceston, Tasmania. [Mr. W. F. Petterd.

Leeds Geological Association: an Address delivered Oct. 28, 1878, by Mr. B. Holgate, F.G.S. [The Association.

On the Variation of Sculpture exhibited in the Shells of the Genus Nassa, by F. P. Marrat. [Mr. F. P. Marrat.

Label list of the Genus Nassa, by F. P. Marrat. [Mr. F. P. Marrat.

THE COLLECTION.

The donations to the collection have been numerous and valuable and are as follows :—

Mr. R. D. Darbshire, B.A., F.G.S., of Victoria Park, Manchester—*Panopæa aldrovandi* from Faro.

Mr. J. S. Gibbons, M.B., of Southampton—A large and valuable collection from West Indies, Spanish Main, &c. A full list of this donation was printed in the notice of the 48th meeting.

Mr. John Emmett of Boston Spa—*Clausilia bidens* from Rome.

Mr. J. W. Taylor of Leeds—*Cochlicopa tridens* var. *Nouletiana*

Dupuy and var. *crystallina*, both from Ilkley, Yorkshire.

EXHIBITS.

The exhibits have been interesting, the most worthy of note are :—A fossil or subfossil specimen of *Succinea oblonga*, Drap., collected in the alluvium near York by Mr. R. M. Christy of Brighton; new species of *Physæ* from Queensland; an *Amphipeplea* from New Guinea; a very fine collection of Tasmanian land and freshwater shells, received by the Secretary from Mr. W. Legrand of Hobart Town and Mr. W. F. Petterd of Launceston; a collection of Algerian land shells, collected by Mr. J. H. Ponsonby of London, and a number of Australian *Physæ* from the same gentleman.—These latter are now in the hands of Mr. Smith of the British Museum, who is examining, with a view to publication, the Australian freshwater shells.

Mr. Robert Scharff exhibited a fine collection of French recent land and freshwater shells and fossil freshwater species from the freshwater beds at Sancats near Bordeaux, also the new form of *Pupa Strobili*, discovered by Mr. Scharff near Bordeaux, and named by Dr. Boettger of Frankfort *v. Scharffi* in his honor.

A large display has been made at the meetings of Yorkshire shells by various members, and full particulars are posted in the Society's record books.

A large quantity of shells have been distributed amongst members attending the meetings, the principal donors being Mr. R. Scharff, Mr. R. D. Darbshire, B.A., F.G.S., Mr. Charles Ashford, Mr. W. Nelson, Mr. W. D. Roebuck, Mr. W. H. Hay, and Mr. T. W. Bell.

PAPERS READ.

Among the few papers read during the year, that by our Vice-President, on collecting in the alluvium—a method that has not been systematically followed in England, and to which we trust our fellow members will give attention—was the most important. The others were :—“Descriptions of *Amphipeplea Petterdi*,

nov. spec., from New Guinea :” by Wm. Nelson ; “ Descriptions of Three New Species of *Physa* from Queensland : by William Nelson and John W. Taylor—(the species described were *P. Brisbanei* *P. Beddomei* and *P. fusiformis*) ; “ Description of *Helix Petterdiana* nov. spec., from Tasmania :” by John W. Taylor.



SUGGESTIONS FOR A SERIAL ARRANGEMENT OF THE VARIATIONS OF OUR BANDED LAND SHELLS.

BY CHARLES ASHFORD.

(Read before the Conchological Society).

An examination of a large number of individuals of *H. virgata*, *caperata*, *erictorium* and *B. acutus* has led me to observe what appear to be analogous changes now going on in these four species respectively, with regard to their colored ornamentation. And, in selecting these four for consideration, I shall confine my remarks within these limits, simply because I have had better opportunities for observing them, and not because I consider the suggestions to be offered as inapplicable altogether to the other banded species.

I will not raise the question whether the three *Helices* above-named derive their origin from a single remote ancestral species, nor whether the descent of *B. acutus* was at a still more remote period a bifurcation from the same stemma, but the varied ornamentation of their existing forms suggests the probability that each species is derived from ancestors having the common characteristics of (1) two well defined and continuous zones, one above

and the other below the periphery, the latter being multiple, and (2) a surface much less sculptured, or diversified by striæ, ridges, plaits or wrinkles than even the smoothest of the four at the present day.

Circumstances, the causes of which are not evident, have in the course of time greatly modified the outer surface of the shell. This I shall endeavour to establish.

It will be admitted by all who have even casually noticed a few score of these shells, especially if collected from different localities, that a change in the colored markings has taken place. When we see a series of forms differing much in the extremes, but having the characteristics of individuals gliding imperceptibly into those of their neighbors, the idea first suggested to the mind is that of progressive change. Now the tendency of the modifications of color has been towards a gradual breaking-up of the bands into beads, blotches or multiple zones. Its cause, at least as far as the beads and blotches are concerned, must be sought for I think in the more or less coarse ridges in the line of growth. An examination with the lens will show that those parts of the shell which are interposed between the segments of the broken zone are hard and often enamelled processes rising above the level of the colored parts; and such an examination can hardly fail to bring the conviction that it is the growth of these processes which has been the cause of the interception referred to. The existence of striæ then and the fragmentary state of the zones stand to one another in the relation of cause and effect. But we admit that the condition of the zones has undergone a change, therefore the state of the striæ has changed also.

This being the case, it seems fair to assume that the first change which took place in the distinctly zoned progenitors referred to, manifested itself in the gradual development or increased development of external striæ, of which ridges such as diversify *B. acutus* and other shells are only a more pronounced

and abnormal form. Why these striæ should not accept the coloring matter is not quite clear. Whether by their greater thickness and opacity they do not allow the pigment to be seen through their upper surface, or whether from a want of homogeneity common to all uncrystallized matter in course of concretion, these ridges are more indurated than the rest of the shell structure, and thus less capable of absorbing the pigment, can be determined only by a microscopic examination of a carefully prepared section. As these ridges gradually invaded the region of the zones, they broke here and there into the continuity of the bands; peculiarities thus formed were transmitted to broods which displayed still further development of striæ, and a change once set up it is not difficult to follow its progress. How far does the existing state of the four species under consideration bear out these conclusions?

The four species have evidently not proceeded *pari passu* in their march toward the disintegration of the colored bands. The modification is most advanced in the case of *B. acutus* (among the individuals of which species it is very rare to find one with perfectly continuous bands though one of the two may often be so), and is least advanced in the case of *H. ericetorum* (among which broken bands are the exception). *H. caperata* and *virgata* take their places between these two extremes in the order named. Now when we come to examine the sculpture of these species we find, if we direct our attention to large numbers of individuals and not to exceptional cases, that *B. acutus* has the ridges most pronounced and irregular, while *H. ericetorum* has a comparatively smooth shell. The other two in this respect also, take intermediate positions and in the same order as before. So far then as regards these species, their several tendencies to a disintegration of the bands are in direct proportion to their tendencies to acquire prominent, irregular, enamel-like ribs.

The interruption of the upper zone having once commenced it may be observed to have taken two courses in the progress of

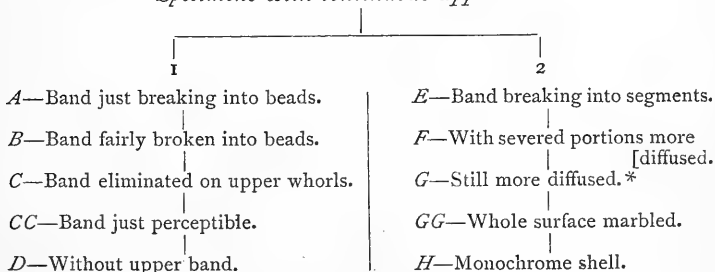
change—one towards obliteration, the other towards diffusion. In cases where the secretive power of the color glands has become defective, less coloring matter has been deposited, the beads have become more separated, first at the remote apex, then gradually lower down the whorls, until in time individuals have been produced totally devoid of vestiges of an upper band. On the contrary in cases where the secretive organ has retained its vigour, or for some reason or other has become increased in energy the superabundant pigment supplied, unable to find access to the enamelled ribs has diffused itself transversely into the more porous structure of the intervening parts, producing those blotches of color which give to so many shells their marbled appearance. Examples of this occur in all the four species under consideration, but are especially noticeable, as might be expected from what has been already said, in a large percentage of individuals of *B. acutus*. Indeed instances are not wanting at any rate in three of the species, in which this diffusion has extended to the whole surface of the shell which then presents the phenomenon of a monochrome divided only by the uncolored striæ, when present. I am not at all prepared to assert that the irregular patches of color on all heliciform shells which possess it, indicate zoned progenitors, it would require an infinitely better acquaintance with exotic forms than I possess to make so general an assertion. But I should not be surprised if facts are found to support such a hypothesis.

If these views be correct, as I think they are as regards the species under consideration, it will follow that the variety *bizona* of *B. acutus*, far from having been converted by circumstances exterior or organic from the ordinary phase of that species to its present pretty ornamentation, exhibits on the contrary that state which retains most of the characteristics of far earlier forms. It has been left behind in the march of change, outstripped by the great mass of individuals of that species. Therefore in

any attempt to display a species in natural sequence in a museum the var. *bizona* should stand at the head of the series representing *B. acutus*. The same applies to the clear banded var. of *H. caperata*. they were once typical but simply from decrease of numbers have become varietal. In the cases of *H. virgata*, and *ericetorum* the changes of surface have made slower progress and those individuals which retain the zones unbroken, still form the majority of their kind. An examination of the var. *bizona* of *B. acutus* however reveals the fact that their bands are more or less giving way. The colony of them on High Down near, Freshwater, though numerous, occupy but a limited nook; and though among themselves they doubtless produce *bizonas* "after their kind," yet from constant intercourse with their less richly ornamented neighbours, which surround them and to some extent wander into their pasture ground, it is not difficult to foresee a time when their posterity will have become undistinguishable from the prevailing type, while ages will probably pass before the banded individuals of *H. ericetorum* become a mere variety of their kind.

A not unnatural arrangement of the variations of these species would therefore seem to be after this manner :—

Specimens with continuous upper band:



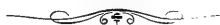
*Many shells, having reached this stage of diffusion, appear to degenerate, the patches becoming gradually obliterated till section D is reached though a different channel.

We come now to the consideration of the second primitive zone situated below the periphery. This I think was multiple in all the four species, but it is almost impossible to determine the number of the group when it existed before changes set in.

These changes have been so numerous that it is very difficult to suggest a mode of classification at all methodical, but this is the less to be regretted as the undersides are less generally exposed to view in museums. They are not however on that account less worthy of attention. The modification of this multiple zone are chiefly conspicuous (1) by the nonproduction of some or all of its members; (2) by their multiplication; (3) by their confluence; (4) by obliteration (5) by diffusion. The causes of the last two—obliteration and diffusion—appear to be the same as those which have prevailed on the upper side, but since the striæ are usually less developed below we are not surprised to find as the result that the inferior zone shows more power of endurance than the superior one, and sometimes exists entire when the latter has become obliterated. The causes of absence, multiplication and confluence must be looked for rather in modifications of the secretive glands of the animal than in the outer structure of the shell. Examples of these variations are so numerous in the case of the three *Helices* that we need only remark upon the *Bulimus*. Instances of a compound zone occasionally occur in the case of *B. acutus*; but as this species has reached a more advanced stage of change than the *Helices* they are less frequent. It may be objected that these exceptions may be accounted for by multiplication as in the equally exceptional six and seven-banded individuals of *H. nemoralis*, and that had the original ancestors of *B. acutus* possessed such a compound zone more frequent vestiges of it would be found among the very numerous individuals which retain the inferior band. This objection has great weight; but does not the fact (as I believe it to be,) that the exceptions referred to occur only among individuals of the var. *bizona*—the section of

the species which has suffered least change—account for their absence among the more advanced typical forms. Again, may not the darker shade of color, which often prevails between the zone and the umbilicus of all varieties of *B. acutus*, be such a vestige diffused into a monochrome? If not, how is this latter to be accounted for?

As this paper is merely suggestive it is hardly necessary to tabulate the undersides, but a series exhibiting the most striking phases should find a place in collections intended like our museums for educational purposes. Series exhibiting variations of size and shape should also not be omitted since the latter, more especially, may have a most important bearing upon the origin of species.



ON *RHYTIDA CAFFRA* Fér.

—By J. S. GIBBONS, M.B.

Shell ovato-orbicular, umbilicate, coarsely rugoso-striate; whorls $3\frac{1}{2}$ to 4; last twice breadth of spire, latter flattened; epidermis thick, reflected over edge of peristome, dark greenish-yellow, transversely streaked with olive-green; interior lined with a thin milky-white membrane.

Length 1.18; breadth 1.87.

Animal has the body elevated in front with a broad, rounded dorsum; sides deeply concave; margin of foot slightly spreading; behind the posterior part of the body is broadly lanceolate, tapering to a sharp end, depressed, but bearing a distinct keel; color a dull opaque-grey on the sides—dorsum a rather rich yellowish-umber color, with darker brown along the tail behind and with three broad streaks in front; one mesial, the other somewhat lateral and running from the collar to near the oral

tentacles, being connected to the ocular by a branch; in front of shell the surface is strongly granuloso-striate in an anteriorly oblique direction; behind the striæ run the reverse way; three close sulcæ separated by rounded granular ridges pass from the collar to the head along the middle; ocular tentacles long and spreading, conical; oral, cylindrical and directed horizontally forwards, labial pair, short, thick, conico-triangular—angulate on the outer side, protruding almost directly outwards, or at right angles to the oral pair—all the tentacles are dark greyish-brown, finely, but distinctly granulate.

Collected at Port Natal and Port Elizabeth. Not a common species at either place and almost invariably dead. It is said to burrow in the sandy soil during dry weather, and on the rare occasions when it has been taken alive, to have usually occurred on or near animal matter.

I kept a live specimen in a tumbler for some little time in order to observe the animal, and afterwards for a month or two in a dry box; it made no attempt to attach the aperture of the shell to anything or to close it with an epiphragm. The labial tentacles are employed as feelers, being constantly applied to the surface on which the animal walks. They are protruded and withdrawn with great celerity and while the animal is in motion are never still for a moment. The oral pair on the contrary being kept steadily pointed forwards. When the animal reached the top of the tumbler, and the front half of the body was free, these tentacles would be protruded to their full extent and curved downwards in search of something on which to continue the journey. When fully extended it is seen that the oral and labial tentacles arise close together but not from a common base.

I fed my specimen on boiled potatoe, which it ate with apparent relish. Previously it had taken the anterior end of a small living *Ennea* into its mouth, and retained it there until I removed it.

BIBLIOGRAPHY.

1877.

Angas (G. French, C.M.Z.S., &c.)—Descriptions of two genera and twenty species of marine shells from New South Wales.—P. Z. S., 1877, p. 34 to 40 and plate v.

The two new genera are *Microvoluta* and *Cirsonella*—the latter of which is placed provisionally among the *Trochidae*: it differs from *Crossea* A. Ad., *Putilla* A. Ad., *Microthyca* A. Ad., and *Umbonella* A. Ad., by characters which are pointed out. The new species are *Purpura* (*Cronia*) *anomala*, *Microvoluta australis*, *Columbella* (*Anachis*) *speciosa*, *Turbonilla festiva*, *Cingulina Brazieri*, *Apicalia Guentheri*, *Cerithiopsis purpurea*, *Conus* (*Stephanokonius*) *Smithi*, *Drillia amula*, *Mangelia Jacksonensis*, *M. flavescens*, *Clathurella Brencleyi*, *C. rufozonata*, *C. pustulata*, *C. modesta*, *Cirsonella australis*, *Ethalia Brazieri*, *Myonia sinuata*, *Tornatina Hofmani* and *Tornatina Brencleyi*.

Angas (G. French, C.M.Z.S., &c.)—Descriptions of a new genus of Gasteropodous mollusca from Japan, and of a new species of *Bullia* from Kurrachi.—P. Z. S., June 5, 1877, pp. 529 and 530 and plate liv.

The new genus *Thatcheria* cannot as yet—in the absence of a knowledge of the operculum—be allocated to its precise generic position; but is for the present referred to the sub-family *Fusinæ*. The new species—*T. mirabilis*—is founded on a unique example from the Japan seas. The new species of *Bullia*—*B. (Leiodomus) Kurrachensis*, was collected by Mr. Angas' daughter at Kurrachi.

Bennett (George, M.D., F.L.S.)—**Notes on the Pearly Nautilus**.—Ann. and Mag. Nat. Hist., Oct., 1877, 4th ser., vol. xx., pp. 331 to 334.

Note on its habits and habitat. The author agrees with Dr. Jeffreys in stating that it is a mistake to suppose that *Nautilus* and *Spirula* are deep sea molluscs.

Benoit (Cav. Luigi) and **Grillo** (Giuseppe Granata).—**Sulla Venus Joenia, n. sp.**—Bull. Soc. Mal. Ital., 1877, vol. iii., pp. 61 to 64 and plate iii.

Various localities in the Italian seas are given for this species, which from the synonymy, appears to have been hitherto considered merely as a variety of *V. Casina* L.

Brazier (John, C.M.Z.S.)—**Description of a new Murex, collected at Port Darwin, by W. T. Bednall**.—Proc. Linn. Soc. N. S. Wales, 1877, vol. ii., pp. 6 and 7.

M. (Pteronotus) Bednalli, allied to *M. eurypteron* Reeve and *M. expansus* Sow.

Brazier (John, C.M.Z.S.)—**Mollusca of Chevert Expedition** (continued).—Proc. Linn. Soc. N. S. Wales, 1877, vol. ii., pp. 1 to 6, 20 to 25, 41 to 45, 46 to 53, 55 to 60, 74 to 89, 128 to 135, 143 to 145.

One *Turritella*, 1 *Siphonium*, 6 *Vermetus*, 1 *Bivonia*, 3 *Cladopoda*, 1 *Tangadus*, 1 *Tenagodus*, 2 *Siliquarus*, 2 *Onustus*, 1 *Xenophora*, 3 *Calyptrea*, 1 *Galerus*, 1 *Capulus*, 1 *Amathina* and 6 *Vanikoro* are catalogued. The localities are the same as in the previous papers of the series. Three *Nerita*, 1 *Theliostyla*, (s. g. of *Nerita*), 9 *Neritina* and s. genera *Vitta*, *Dostia* and *Neripteron*, 1 *Eutropia*, 1 *Turbo*, 5 *Senectus*, 1 *Pachypoma*, 3 *Liotia*, 1 *Umbonium*, 1 *Angaria*, 1 *Trochus*, 2 *Tectus*, 1 *Polydonta*, 2 *Clanculus*, 1 *Monodonta*, 4 *Euchelus*, 2 *Thalotia*, 8 *Ziziphinus*,

3 *Eutrochus*, 1 *Monilea*, 7 *Stomatella* (one of them, *S. ornata* N.E. Australia, allied to the New Caledonian *S. picta* Montrouz., and *S. stellata* Souv. is described as new), 1 *Gena*, 4 *Haliotis*, 1 *Teinotis*, 12 *Lucapina*, 1 *Macrochisma*, 1 *Rimula*, 4 *Emaiginula*, 1 *Scutus*, 16 *Dentalium* (the new species are *D. decemcostatum*, New Guinea, *D. duodecimcostatum*, Torres Straits, *D. robustum*, New Guinea, *D. Katowense*, New Guinea, *D. septemcostatum*, North Australia, *D. quadricostatum*, N.E. Australia, Torres Straits, New Guinea, *D. annulosum*, N.E. Australia (allied to *D. politum* L. and *D. læve*, N.E. Australia and Torres Straits), 1 *Scutellina*, 1 *Patella*, 2 *Tonica*, 2 *Chiton*, 1 *Schizochiton*, 2 *Cryptoplax*, 1 *Actæon*, 5 *Buccinulus*, 5 *Ringicula*, (one of them new—*R. abyssicola*, Darnley Is., Torres Straits), 1 *Aplustrum*, 5 *Cylichna* (one new—*C. minuta*, Darnley I.), 2 *Mnestia* (one new—*M. granosa*, Darnley I.), 5 *Tornatina*, 1 *Volvula*, 2 *Bulla*, 4 *Haminea* (one new—*H. decora*, N.E. and N. Australia), 3 *Scaphander* (*S. multistriata*, new, Darnley I.), 13 *Atys* (of which are described as new—*A. Darnleyensis*, *A. Cheverti*, *A. pulchra*, *A. densa*, *A. dubiosa*, all from Darnley I., Torres Straits), 2 *Philine*, 2 *Dolabella*, 1 *Aplysia*, 2 *Pythia*, 4 *Cassidula*, 4 *Auricula*, 2 *Pleconema*, 1 *Laimodonta*, 7 *Melampus*, 3 *Siphonaria*, 3 *Nautilus*, 2 *Cavolina* and 1 *Sinusigera*.

Brot (Dr. Aug.)—Catalogue of the genus Canidia.—Catalog der Gattung Canidia H. Adams.—Jahrb. deuts. Mal. Ges., Oct. 1877, vol. iv., pp. 299 to 300.

Thirteen species cited.

Brot (Dr. Aug.)—Catalogue of the genus Clea.—Catalog der Gattung Clea H. Adams.—Jahrb. deuts. Mal. Ges., Oct. 1877, vol. iv., p. 300.

Two species enumerated.

Cash (William, F.G.S.)—**Notes on carboniferous Cephalopoda.**—Part I., Recent Cephalopoda.—Extract from Proc. Geol. and Polyt. Soc. West Riding of Yorkshire, 1877, new series, vol. i., 23 pages and plate xi.

The author having taken up the study of fossil Cephalopoda has in this paper prefaced his account by a sketch of the general organization and classification of the recent species, their distribution and phylogeny.

Dall (W. H.)—**On Alaskan Brachiopoda.**—Reports on the Brachiopoda of Alaska and the adjacent shores of Northwest America).—Article III. of the Scientific Results of the Exploration of Alaska, June, 1877, pp. 45 to 62, also Proc. Ac. Nat. Sci. Phil., 1877, pp. 155 to 170.

The distribution, &c., of the 10 Alaskan species is duly noted and synonymy given. The author then points out that species of *Magasella* appear to co-exist with other species of the group which they to some extent resemble. He discusses this subject from various points of view, rejects the notion that the *Magasellæ* are young of the other species, and finally concludes in favour of a modified evolutionary view, accepting the idea that species are sometimes modified suddenly.

Dall (W. H.)—**Index of Names of Brachiopoda.**—Index of names applied to the class, orders, tribes, families, genera, subgenera, and sections of the Brachiopoda (excluding the Rudistes) previous to the year 1877.—Bulletin of the U. S. Nat. Museum, No. 8, 1877, 88 pages.

The index of names arranged alphabetically and with full references and dates, forms the principal part of the paper. This is followed by a systematic list of the genera, a list of the species described by Linnæus and their modern equivalents, and a table showing approximately the known distribution of the chief groups of Brachiopoda in geological time.

Dall (W. H.)—On the Californian species of *Fusus*.—*Proc. California Acad.*, 19 March, 1877.

Dall (W. H.)—Preliminary descriptions of new species of mollusks from the Northwest Coast of America.—*Proc. California Ac. Sci.*, 19 March, 1877.

Chrysodomus crebricostatus, *C. brunneus*, *C. roseus*, *Volutopsis callorhinus*, *Liomesus nux*, *Buccinum castaneum*, and (?) var. *tricarinatum*, *B. picturatum*, *B. fringillum*, *Trophon muriciformis*, and *Pandora grandis*.

Fielden (Capt. H. W., C.M.Z.S.)—Arctic Molluscan Fauna.—*Zool.*, Oct., 1877, 3rd series, vol. i., pp. 435 to 440.

Capt. Fielden refers to the feeling of disappointment expressed by Mr. Smith and Dr. Jeffreys and points out that they did not take into consideration the fact that the species were truly arctic and did not include collections made in Davis' Straits and Baffin's Bay. Capt. Fielden believes that species thinning out northwards his collections fairly represent the fauna of the extreme north. He discusses the causes of the absence of mollusca in the northern seas, and gives a table of the number of species collected by various expeditions, in which the "Valorous" figures for 122, Belcher for 45, Hayes for 21 and Fielden for 35, the respective latitudes being 60°—70°, 75°—77°, 78°—79°, 79°—82° 30' North.

Friele (Hermann).—Preliminary Report on mollusca from the Norwegian North Atlantic Expedition in 1876.—*N. Mag. for Naturvidenskaberne*, vol. xxiii., Heft 3, 1877.

The new species are:—*Montacuta Voeringi*, *Astarte acuticostata* Jeff., *Arca Frielei* Jeff., *Cyclostrema Peterseni*, *Rissoa*

Wyville-Thomsoni Jeff., *Cerithium Danielseni*, *Buccinum Mörchi*, *Fusus Mohni*, *F. turgidulus* Jeff., *Bela ovalis*, *B. Willei* and *Philine Ossian-Sarsi*.

Grillo (Giuseppe Granata).—On *Cirropteron semilunare* Sars, and on the new subgenus *Monophorus*.—Sul *Cirropteron semilunare* Sars, e del nuovo sottogenere *Monophorus*.—Bull. Soc. Mal. Ital., 1877, vol. iii., pp. 54 to 63 an tav. ii.

The genus *Cirropteron* is diagnosed, also the species is figured. The subgenus *Monophorus* is differentiated from *Triphoris*, and instituted for reception of *Cerithium nigrocinctum* C. B. Ad., whose characters are given.

Hilgendorf (H.).—A new recent *Pleurotomaria*.—Sitzungs-Bericht der Ges. Naturforschender Freunde zu Berlin vom 20 März 1877.

P. Beyrichii Hilg., Japanese seas.

Kobelt (Dr. W.).—Introductory remarks on the provinces of the marine fauna in the North Pacific Ocean.—Einleitende Bemerkung über die Provinzen der marinen Fauna im nordpazifischen Ocean.—Nachrichtenblatt d. deuts. Mal. Ges., April and May, 1877, vol. ix., pp. 33 to 35.

A summary of Capt. W. H. Dall's views.

Kobelt (Dr. W.).—Catalogue of genus *Murex* (excluding *Trophon*, *Vitularia* and *Typhis*).—Catalog der Gattung *Murex* Lam. (excl. gen. *Trophon*, *Vitularia* and *Typhis*).—Jahrb. Deuts. Mal. Ges., April, 1877, vol. iv., pp. 141 to 161, July, 1877, vol. iv., pp. 238 to 252.

Arranging them under the subgenera *Tribulus*, *Chicoreus*, *Phyllonotus*, *Homalocantha*, *Pteronotus*, *Cerastoma* and *Ocinebra*, Dr. Kobelt enumerates in all 263 species of *Murex*.

Kobelt (Dr. W.)—Catalogue of the genus *Vitularia* Swainson.—Jahrb. Deuts. Mal. Ges., July, 1877, vol. iv., pp. 252 and 253.

Five species enumerated.

Kobelt (Dr. W.)—On Northern Mollusca.—Zur Kenntniss der nordischen Mollusken.—Jahrb. Deuts. Mal. Ges., July, 1877, vol. iv., pp. 257 to 264.

Notes on *Montacuta Voeringi* Friele, *Astarte acuticostata* Jeff., *Arca Frielei* Jeff., *Malletia cuneata* Jeff., *Pecten fragilis* Jeff., *Pilidium commodum* Midd., *Cyclostrema Peterseni* Friele, *Rissoa Wyville-Thomsoni* Jeff., *Cerithium Danielseni* Friele, *Buccinum Mörchi* Friele, *Fusus Berniciensis* King, *F. ebur* Mörch nec Kobelt, *F. lachesis* Mörch, *F. Sabini* Gray, *F. Mohni* Friele, *F. turgidulus* Jeff., *Pleurotoma (Bela) ovalis* Friele, *P. (B.) Willei* Friele and *Philine Ossian-Sarsi* Friele.

Kobelt (Dr. W.)—Catalogue of the genus *Typhis*.—Catalog der Gattung *Typhis* Montf.—Jahrb. deuts. Mal. Ges. Oct., 1877, vol. iv., pp. 287 to 289.

Eighteen species enumerated.

Kobelt (Dr. W.)—Catalogue of the genus *Bullia*.—Catalog der Gattung *Bullia* Gray.—Jahrb. Deuts. Mal. Ges., Oct., 1877, vol. iv., pp. 289 to 294.

Thirty-five species, divided into two sections, viz. *Bullia sensu stricto* and *Pseudostrombus* are enumerated.

Kobelt (Dr. W.)—Catalogue of the genus *Eburna*.—Catalog der Gattung *Eburna* Lamarck.—Jahrb. deuts. Mal. Ges., Oct., 1877, vol. iv., pp. 294 to 295.

Eleven species enumerated.

Kobelt (Dr. W.)—Catalogue of the genus Hindsia.—
Catalog der Gattung Hindsia A. Adams.—Jahrb. Deuts.
Mal. Ges., Oct., 1877, vol. iv., pp. 296 to 7.

Fourteen species enumerated.

Kobelt (Dr. W.)—Catalogue of the genus Cyllene.—
Catalog der Gattung Cyllene Gray.—Jahrb. deuts. Mal. Ges.,
Oct., 1877, vol. iv., pp. 297 to 299.

Nineteen species enumerated.

Kobelt (Dr. W.)—Catalogue of the genus Voluta.—
Catalog der Gattung Voluta Lam. (em.)—Jahrb. deuts. Mal.
Ges., Oct., 1877, vol. iv., p. 301.

Seventy-five species are enumerated, and the following
sections of the genus adopted for their reception:—*Voluta, sensu
stricto*, *Harpula* Swainson, *Fulgoraria* Schum., *Vespertilio* (Klein)
Crosse, *Aulica* Crosse, *Amoria* Gray, *Alcithoe* Ad., *Cymbiola*
Swainson, *Volutella* D'Orbigny, *Psephæa* Crosse, *Ausoba* Adams,
Volutilithes Swains., *Volutoconus* Crosse, *Callipara* Gray, *Aurinia*
Ad., and *Mamillana* Crosse.

**Koren (J.) and Danielsen (D.)—Descriptions of six new
species of the gastropod tribe Solenopus M. Sars.**
—Arch. f. Math. Naturv., 1877, vol. ii., No. 2, pp. 120 to
128.

**Marrat (F. P.)—On forty proposed new forms in the
genus Nassa.**—Liverpool, July 1st, 1877, 8vo., 16 pages
and coloured plate.

Moebius (Karl).—Oysters and Oyster-culture.—Die
Auster und die Austerwirthschaft, Berlin, 1877, map and
9 woodcuts.

Monterosato (A. de).—Shells of Civita Vecchia.—Notizie sulle conchiglie della rada de Civita Vecchia.—Annali del. Mus. Civ. di St. Nat. di Genova, vol. ix., p. 407.

One hundred and eighty-two species, of which *Cyclostrema catenoides* and *Turritella turbona* are new. For *Patella Gussoni* is created a new genus *Scutulum*.

Morch (Dr. O. A. L.).—Conchological Notices.—Conchologische Mittheilungen.—Nachrichtsblatt d. deuts. Mal. Ges., June and July, 1877, vol. ix., pp. 58 to 59.

The notes refer to species of *Fusus*, *Buccinum*, *Cassis*, *Triton*, *Dolium* and *Strombus*.

Norman (Rev. A. Merle, M.A.).—On two new British Nudibranchiate Mollusca.—Annals and Mag. Nat. Hist., Dec., 1877, 3 pages.

Eolis sanguinea from Roundstone Bay, Connemara; and *Lomonotus Hancocki*, dredged off Berry Head, Torbay.

Paulucci (M.).—On the genus Struthiolaria (2nd article).—Ancora del genere Struthiolaria Lamarck.—Bull. Soc. Mal. Ital., 1877, vol. iii., pp. 49 to 53.

The authoress gives an account of her examination of the shells of this genus in the museums of Paris and London.

Pagenstecher (H. A.).—Mollusca from the coasts of the Red Sea.—Kossmann, Robby, Zoologische Ergebnisse einer Reise in die Küstengebiete des rothen Meeres. II. Mollusca, bearbeitet von. H. A. Pagenstecher.

One hundred and twenty-six species, from Massowah and Dahlak Island. The new species are *Isognomon flabellum*; *Cerithium Isselii-Savigny*, t. 4, f. 1 and 2; *Pusio Kossmanni*; and *Crepidodoris* (n. g.) *plumbea*.

Schmeltz (J. D. E.)—Contributions to Molluscan Geography.—Beiträge zur Mollusken-Geographie.—Nachrichtsblatt d. deuts. Mal. Ges., Oct., 1877, vol. ix., pp. 81 to 82.

The localities given of 16 species of *Ranella* in the Museum Godeffroy at Hamburgh.

Tate (Prof. R.)—Description of two new Marine Gastropoda from South Australia.

Trochocochlea chloropoda, on rocks below tide mark, Coymbra and near Wilson's Bluff; *Ethalia* (?) *cancellata*, shell sand, Holdfast Bay, St. Vincent's Gulf, Streaky and Fowler's Bays (pl. v., fig. 11a, 11c).

Tate (Prof. R.)—Zoologica and Palæontologica Miscellanea, chiefly relating to South Australia.—1879.

On a new species of fossil Lamellibranchiata for which a new genus is erected:—*Zenatiopsis angustata* (pl. v., fig. 6a, 6b), from the older tertiary of Muddy Creek, Hamilton, Victoria and the upper Murravian near Morgan on the River Murray. Four new species of *Kelliadæ* are also described:—*Lepton crassum* (pl. v., fig. 9), *L. planiusculum* (fig. 12), *L. trigonale* (fig. 5), and *Bythinia gemmata* (fig. 8).

Tate (Prof. R.)—Descriptions of new species of South Australian Pulmoniferous snails.

Four species new to science are described, and a var. of *Bulimus indutus* Menke—*pallidus*—differentiated. The new species are *Helix subsecta*, Port Wakefield Scrub (pl. v., fig. 2a, 2b; *H. Nullaborica*, Nullabor plain (pl. v., fig. 1a, 1b); *Bulimus sinistrorsus*, Peelunibie (pl. v., fig. 4); *Plecotrema ciliata*, Port Adelaide and Streaky Bay (pl. v., fig. 7a, 7b).

Call (R. E.)—Reversed Melanthonæ.—Am. Nat., vol. xiv., p. 207, March, 1880.

From investigations made it was found that in their youngest state 2 per cent. of *M. integr* and *M. rufus* and about $1\frac{1}{2}$ of *M. decisus* were sinistral. Compared with specimens collected, only about 1-tenth per cent. would appear to survive to reach maturity.

The author accounts for sinistraction and various malformations by the crowded position of the embryo.

Tiberi (Dott. N.)—Cefelopodi, Pteropodi, Eteropodi, viventi nel Mediterraneo e fossili nel terreno terziario Italiano, con aggiunte e correzione.—Cephalopoda, Pteropoda and Heteropoda existing in the Mediterranean or fossil in the Italian territories.

Witter (Prof. F. M.)—Land and freshwater mollusks of Muscatine County, Iowa.—History of Muscatine County, 8vo., 1879, p. 332 and 333.

The list has no localities (simply indication of scarcity or abundance) and includes 20 species or varieties of *Helix*, 1 of *Cionella*, 4 of *Pupa*, 3 *Succinea*, 1 *Limax*, 1 *Tebennophorus*, 1 *Carychium*, 4 *Limnæa*, 3 *Physa*, 6 *Planorbis*, 1 *Segmentina*, 1 *Ancylus*, 1 *Valvata*, 1 *Lioplax*, 1 *Melantho*, 1 *Vivipara*, 2 *Amnicola*, 1 *Bythinella*, 1 *Somatogyrus*, 1 *Pleurocera*, 3 *Sphærium*, 1 *Pisidium*, 17 *Anodonta*, 5 *Margaritana*, and 43 of *Unio*.

Witter (Prof. F. M.)—Notes on Wyoming Hills.—A paper read before the Muscatine Academy of Science, June 2, 1879, 8vo., 4 pages.

This paper includes notes on various species of subfossil shells, and a few recent ones. Those cited include *Limnæa desidiosa* Say, *Succinea obliqua* Say, *S. avara* Say, *Helix lineata*

Say, *H. minuscula* Binney; *Pupa corticaria* Say., *P. armifera* Say, *Helix thyroides*, &c. Wyoming is on the Mississippi River, in the state of Iowa.

Hildebrandt (A.)—**The Science Index**: a monthly guide to the contents of the scientific periodicals—4to., 60 pp., colored cover, now includes 50 periodicals.

Tate (Prof. R.)—Notes on the Conchology of King George's Sound.

A list of 18 species of marine shells found in shell sand brought from the locality by Prof. John Davidson, and which were not previously recorded, two species are described as new, *Turbinella erubescens* (pl. v., fig. 10) and *Utriculus apiculatus* (pl. v., fig. 3).

Smith (Edgar A.)—Diagnoses of New Species of Pleurotomidæ in the British Museum.—Ann. and Mag. Nat. Hist., June, 1877, 4th series, vol. xix., pp. 488 to 501.

P. amicta, Sandwich Islands; *P. Nellieæ*, Mauritius; *P. Ceylonica*, Ceylon; *P. acutigemmata*, Hab.?[?]; *P. retusispirata*, Hab.?[?]; *P. cognata*, Australia; *P. antipodum*, New Zealand; *P. multiseriata*, Ceylon, Persian Gulf and China Seas; *P. albofasciata*, Sandwich Islands; *P. zealandica*, New Zealand; *P. (Drillia) chokolatum*, Goza Harbour, Japan; *P. (D.) subochracea*, China Seas; *P. (D.) Mindanensis*, Mindanao Island, Philippines; *P. (D.) rotundicostata*, Hab.?[?]; *P. (D.) latisinuata*, China; *P. (D.) nodilirata*, Philippines; *P. (D.) variabilis*, Hab.?[?]; *P. (D.) Atkinsonii*, Hab.?[?]; *P. (D.) angusta*, China Sea; *P. (D.) acuta*, New Guinea; *P. (D.) multilirata*, Port Jackson?[?]; *P. (D.) consociata*, Hab.?[?]; *P. (D.) intertincta*, China Seas & Philippines; *P. (D.) maorum*, New Zealand; *P. (D.) Prattii*, Hab.?[?]; *P. (D.) excavata*, Hab.?[?]; *P. (D.) concolor*, Moluccas and China;

P. (D.) digna, California; *P. (Clionella) Bornii*, Cape of Good Hope; *P. (C.) Kraussii*, Cape of Good Hope; *P. (C.) bipartita*, South Africa, Port Elizabeth; *P. (C.) subventricosa*, South Africa; and *P. (C.) platystoma*, Cape of Good Hope.

Smith (Edgar A.)—Descriptions of New Species of Conidæ and Terebridæ.—Ann. and Mag. Nat. Hist., March 1877, 4th series, vol. xix., pp. 222 to 231.

Conus brevis, Hab.?[?]; *C. croceus*, Hab.?[?]; *C. propinquus*=*C. tenuisulcatus* Sow., P.Z.S., 1873, p. 145, pl. xv., f. 2 (name preoccupied); *C. inconstans*, Hab.?[?]=*C. magellanicus*, Küster (non Hwass) Conch. Cab., pl. 60, f. 2-3; *C. fuscomaculatus*, Hab.?[?]; *Terebra melanacme*, Cape Sima, Japan; *T. tricineta*, Persian Gulf; *T. persica*, Persian Gulf; *T. bathyrhaphe*, Gulf of Yedo, Japan; *T. albozonata*, Matoza Harbour, Japan; *T. Pellyi*, Persian Gulf; *T. Grayi*, Hab.?[?]=*T. gracilis* Gray, P.Z.S., 1834, p. 61 (name preoccupied by a fossil species); *T. (Myurella) fuscobasis*, Persian Gulf; *T. (M.) fuscocincta*, Persian Gulf; *T. (M.) MacAndrewii*, Persian Gulf; *T. (M.) cognata*, Persian Gulf; *T. (Hastula) rufopunctata*, Hab.?[?]; and *T. (H.) confusa*. The synonymy of the last is given, as also of its allies *T. (Impages) cærulescens* Lam., Tahiti, Philippines, Red Sea; *T. (Hastula) cinerea* Born. (West Indies).

Smith (Edgar A.)—On the mollusca collected during the Arctic Expedition of 1875—76.—Ann. and Mag. Nat. Hist., Aug., 1877, 4th series, vol. xx., pp. 131 to 146 and woodcuts.

Thirty-four species comprise the whole collection. These are:—*Pleurotoma (Bela) violacea* Migh. and Ad.; *Fusus (Sipho) tortuosus*? Reeve; *Buccinum hydrophanum* Hanc.; *B. Belcheri*, var. (woodcut); *B. sericatum* Hanc. (cut); *Trichotropis tenuis*, new (woodcut), *T. borealis* Brod and Sow.; *Velutina (Morvillia)*

zonata var. *grandis*; *Natica affinis* Gmel.; *Trochus* (*Margarita*) *umbilicalis* Brod. and Sow.; *T. (M.) glauca* Möller; *T. (M.)* sp. jun.; *Chiton* (*Tonicia*) *marmoreus* Fab.; *Lepeta cæca* O. F. Müll.; *Bulla* (*Cylichna*) *alba* Brown; *B. (C.) striata* Brown; — *Onchidiopsis grænlandica* Bergh., *Eolis salmonacea* Contr.; *Tellina* (*Macoma*) *tenera* Leach; *Lyonsia arenosa* Möller, *Cardium Islandicum* L.; *Axinus Gouldii*? Philippi; *Nucula inflata* Hanc.; *Leda pernula* Müll.; *L. minuta*, var. Fab.; *L. glacialis* Leach; *Astarte semisulcata* Leach; *A. striata* Leach; *A. fabula* Reeve; ? *A. Warehami* Hanc., *Mya truncata* L.; *Saxicava arctica* L.; *Modiolaria lævigata* Gray; and *Pecten* (*Pseudamusium*) *grænlandicus* Sowerby.

Stearns (R. E. C.)—Description of a New Species of Dolabella from the Gulf of California, with remarks on other rare or little known species from the same region.—Proc. Ac. Nat. Sci.—Philad 1878, pp. 325-401.

Sutor (Dr. Aug.)—The Genus Harpa: A Conchological study.—Das Genus Harpa. Eine Conchologische Studie. —Jahrb. Deuts. Mal. Ges., April, 1877, iv. 97 to 129 and colored plates 4 and 5.

The species cited are *H. ventricosa* Lam., *H. costata* (L.), *H. articularis* Lam., *H. nablum* Martini, *H. ligata* (Menke) Sutor, *H. conoidalis* Lam., *H. crenata* Swainson, *H. rosea* Lam., *H. nobilis* Lam., *H. minor* Lam., *H. crassa* Philippi, *H. gracilis* Broderip, *H. striata* Lam., *H. Cabritii* Bernardi, *H. cancellata* Chemn., and *H. virginialis* J. Gray in litt. (Sowerby.)

Tiberi (Dott. N.)—Some historical ideas as to Argonauta.—Bull. Soc. Mal. Ital., 1877, vol. iii., pp. 160 to 164.

Vayssiere (M. A.)—On a New Genus of the Family Tritoniidæ.—Comptes Rendus des Séances de l'Acad. des

Sciences, July 30, 1877, p. 299.—Ann. and Mag. Nat. Hist., Oct., 1877, 4th series, vol. xx., p. 367.

A Tritonid captured in the Gulf of Marseilles at a depth of 50 mètres, is named *Marionia*, allied to *Dendronotus* and *Scyllæa*.

Verkruzen (T. A.)—List of shells collected in 1876 in Newfoundland and Nova Scotia.—Liste der von T. A. Verkruzen. in 1876 in Neufundland und Nova Scotia gesammelten Mollusken.—Nachrichtsblatt d. deuts. Mal. Ges., June and July, 1877, vol. ix., pp. 52 to 57.

Ninety-two species of the genera *Solen*, *Solecurtus*, *Glycimeris*, *Mya*, *Thracia*, *Montacuta*, *Saxicava*, *Macra*, *Tellina*, *Axinus* (*Cryptodon*), *Astarte*, *Cyprina*, *Cardium*, *Cardita*, *Mytilus*, *Modiola*, *Modiolaria*, *Crenella*, *Pecten*, *Lima*, *Anomia*, *Utriculus*, *Chiton*, *Tectura*, *Lepeta*, *Pilidium*, *Puncturella* (*Cemoria*), *Mölleria*, *Margarita*, *Skenea*, *Rissoa*, *Lacuna*, *Litorina*, *Scalaria*, *Acirsa*, *Turritella*, *Menestho*, *Velutina*, *Natica*, *Bela*, *Purpura*, *Trichotropis*, *Buccinum*, *Fusus*, *Yoldia* and *Venus*.

Wiegmann (Fritz).—Contributions to the Anatomy of Mollusca.—Beiträge zur Anatomie der Mollusken.—Jahrb. Deuts. Mal. Ges., July, 1877, vol. iv., pp. 195 to 213, and plates 6 to 8.

The species referred to are *Helix Codringtoni* Gray, var. *umbilicata*, *H. vermiculata* Müll., and *H. serpentina* Fér.

Woods (Rev. J. E. Tenison, F.G.S.)—On a variety of Trigonia Lamarckii.—Proc. Linn. Soc. N. S. Wales, 1877, vol. ii., 125.

Var. *A. reticulata*. Dredged by Brazier outside Port Jackson Heads. Mr. Woods concludes with an enumeration of the six species in the Australian list.

Woods (Rev. J. E. Tenison, F.L.S.)—**Census; with brief descriptions of the marine shells of Tasmania and the adjacent islands.**—Proc. Roy. Soc. Tasm., March, 1877, pp. 26 to 57.

Mr Woods enumerates 3 genera and about 5 species of *Cephalopoda*, 116 genera and 390 species of *Gastropoda*, 55 genera and 136 species of *Conchifera*, and 2 genera and 3 species of *Brachiopoda*—in all 178 genera and 534 species. See Mr. Petterd's article in the present volume, of which this paper of Mr. Woods' is the subject.

Woods (Rev. J. E. Tenison, F.L.S.)—**On Tasmanian Siphonaria, including a new species.**—Proc. Roy. Soc. Tas., 1877, pp. 99—100.

The new species is *S. zonata*, very common on all the south Tasmanian coast.

Woods (Rev. J. E. Tenison, F.L.S.)—**On some new Tasmanian Marine Shells.**—Proc. Roy. Soc. Tas., 1877, pp. 121 to 123.

Turbo cucullata, King's Island, Bass's Straits; *Liotia annulata*, *Crossea cancellata* (a synopsis is given of the 5 known species of this genus; *Marginella cypræoides*; *Rissoa angeli*; *Rissoina minutissima*; *R. unilirata*; and *Bittium minimum*. All but the first-named were dredged in Blackman's Bay by Mr. W. F. Petterd.

Woods (Rev. J. E. Tenison, F.L.S.)—**On a New Species of Neæra.**—Proc. Linn. Soc. N. S. W., 1877, ii, pp. to 123 to 124.

N. latesulcata from Port Jackson at a depth of 16 f.

Dall (Prof. W. H.)—**American Work in the Department of Recent Mollusca during the Year 1879.**—Am. Nat., vol. xiv., No. 6, pp. 426 to 436.

The most important work is considered to be the commencement of publication of Tryon's Manual of Conchology.

Important papers by Prof. Brooks have appeared in the publications of the John Hopkin's University on "The development of *Lingula* and the systematic position of the Brachiopoda" and "Preliminary observations upon the Marine Prosobranchiate Gastropods."

In the Am. Journ. Sci. xviii., No. 108, Dec. 1879, pp. 425—427, is another paper by same author, "Abstract of observations upon the artificial fertilization of oyster eggs, and on the embryology of the American oyster."

Mr. W. H. Dall, in a paper to the Philosophical Society of Washington, suggests the probable homology of the anterior pair of muscles of the oyster with the pedal muscles of Dimyrians.

Prof. Wetherby describes and figures the anatomy of *Limnæa megasoma* in the Journal of the Cincinnati Soc. of Natural Hist., July, 1879.

Prof. Whitfield, at a meeting of the Boston Soc. of Natural Hist., records that in specimens of the same species kept in confinement, the male organs disappeared after several generations.

Mr. W. G. Binney continues in Bull. Mus. Comp. Zool. v., No. 16, p. 332, the description and figuring of the anatomy and radula. About 30 species are examined.

The *Vitrina latissima* Lewis is erected into a new genus *Vitrinizonites*. A slug discovered by Mr. Gibbons in Natal is described under the (preoccupied) name *Chlamydephorus Gibbonsii*. *Pupa cincinnatiensis* is said to be synonymous with *P. contracta*, Say and *Tectula lincta* from Madeira is said to be viviparous.

Mr. Binney also contributes a paper on the jaw and lingual dentition of Costa Rican land shells to the Annals of the New York Academy of Sciences, 1 No. 9, p. 257—262. In it he describes two new genera and species *Velifera Gabbi* (allied to *Helicarion*) and *Cryptostrakon gabbi*, a curious slug with a concealed rudimentary shell and teeth resembling those of *Polygyra*.

Dr. R. Bergh of Copenhagen, in the Proc. Ac. Nat. Sci. of Philad. for 1879, contributes a paper "On the Nudibranchiate Gastropod Mollusca of the North Pacific Ocean, with special reference to those of Alaska," part i., pls. i-viii.

Twenty-seven species are considered. Two-thirds are new, and most of the others were previously insufficiently characterized. Most of the forms are from Alaska, and the paper is based for the most part on the collections of Mr. W. H. Dall.

Mr. W. H. Dall in Proc. of U.S. Nat. Mus., gives "A report on the Limpets and Chitons of the Alaskan and Arctic regions, with descriptions of genera and species belived to be new," pp. 281 to 344.

The paper is a summary of all that is known of the anatomy and development of the Chitonidæ. The table gives the radula of 45 species belonging to 33 genera. The renal pore described by Von Ihering but not found by Dall, appears to be a misconception of Von Ihering's.

Prof. Verrill describes a new Cephalopod and several Gastropods from E. coast of North America.

Mr. Whiteaves in the Canadian Naturalist, vol. viii., n.s., No. 8, has a paper "On some marine invertebrata from the West Coast of North America," containing a list of mollusks from the coasts of British Columbia, one of which, *Cardium Richardsonii*, is described as new. The fauna is Oregonian in character.

Prof. Wetherby in "Notes on Limnæidæ" previously mentioned, describes as new *Helisoma Duryi* from Florida, and

claims to have correctly identified for the first time since it was originally described, Say's *P. glabrátus*.

Mr. Gray in Science News records the diffusion in America of *Litorina litorea*. Other papers by Dr. Cooper, Mr. Stearns, Mr. Calkins, Prof. Packard, are also enumerated by Mr. Dall in this article.



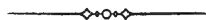
ON THE ASSOCIATION OF *LIMNÆA GLABRA*,
PHYSA HYPNORUM AND *PLANORBIS SPIRORBIS*.

By W. NELSON.

I should wish to call the attention of our members to recording the instances of the occurrence of different species found in company. Being most interested in water species, my attention has been more particularly given to them. Taking no note of such widely spread and common species as *L. peregra* and *L. truncatula* which may be said to occur everywhere, I have myself generally found *L. glabra* associated with *Planorbis spirorbis* and *Physa hypnorum*. At Spark Hill, Birmingham, *L. glabra* was the most abundant species in the ditch, *Planorbis spirorbis* the most scarce. At Acock's Green near Birmingham the three species are equally common. At Stanley near Wakefield the *L. glabra* is very rare, and at Castleford it is the most common of the three. Excluding the *L. glabra* which is the most local of our common *Limnæidæ*, I find *Planorbis spirorbis* and *Physa hypnorum* are often associated together. The only place where I have found *Physa hypnorum* and not yet detected *Planorbis spirorbis* is in a grassy ditch at Leventhorpe pastures near Leeds.

At the undermentioned places I have found the following species together:—

- SPARK HILL near Birmingham.—*Planorbis spirorbis*, *Physa hypnorum* and *Limnæa glabra*.
- ACOCK'S GREEN near Birmingham.—*Planorbis spirorbis*, *Physa hypnorum* and *Limnæa glabra*.
- CASTLEFORD.—*Planorbis spirorbis*, *Physa hypnorum* and *Limnæa glabra*.
- STANLEY near Wakefield.—*Planorbis spirorbis*, *Physa hypnorum* and *Limnæa glabra*.
- WETHERBY.—*Physa hypnorum* and *Planorbis spirorbis*.
- GREET near Birmingham.—*Physa hypnorum* and *Planorbis spirorbis*.
- TEMPLE BALSALL near Kenilworth.—*Physa hypnorum* and *Planorbis spirorbis*.
- KINGSHEATH near Birmingham.—*Physa hypnorum* and *Planorbis spirorbis*.
- SMALLHEATH near Birmingham.—*Physa hypnorum* and *Planorbis spirorbis*.



BULIMUS ACUTUS VAR. *BIZONA* IN THE ISLE OF WIGHT.

By CHARLES ASHFORD.

At page 93 of the current volume, reference is made incidentally to the occurrence of the var. *bizona* in this island. It would be singular if, with our Downs and Dunes as thickly populated with *B. acutus* as they are, the variety were confined to Scotland, Ireland and Wales. Yet, so far as I know, no record exists of its occurrence in any purely English locality. I will therefore give a short description of the interesting colony I have noticed in this neighborhood.

A little east of the beacon which surmounts High Down between Freshwater Bay and the Needles, is a grass-covered depression close to the sea, formed by a local and partial subsidence of the chalk cliff many years ago. Perhaps one or two acres have given way, making a tiny valley sheltered from the north-easters, but exposed to the meridian sun. In this depression and the declivities leading to it—and so far as my observation goes, *nowhere else* in this neighborhood—is a thriving community of the variety *bizona*. Like the Red Indians of the present day, the tribe occupies its own limited pasture ground, and like them also probably had a more extended range in the past. Perhaps we may carry the simile further and say that the gradual extinction of the “coloured” population is due to the encroachment of the “whites.” In the invading whites, however, the ornamented variety recognise their own “kith and kin” as I have had opportunity of observing, and we may presume their offspring is a compromise. Certain it is that among the individuals may be noticed all grades of bizonity if I may use the word. In most the upper band is broken into segments from causes I have suggested in a previous paper, in others the upper zone, which gives name to the variety, exists only on the later whorls, as though the functional power of the colour glands remained dormant during youth, in some cases there is merely a trace of an obsolescent band. These gradations constitute the mulatto, quadroon and octoroon sections of *Bulimus* society, and point to an approaching final issue—the elimination of this varietal distinction. Pure *bizona* blood is already rare—perhaps *2 per mille* may show it. Of several hundred individuals examined, only one has the upper band entire from the apex. One interesting example had *three* bands below the periphery and one above.

Unfortunately a foe more insidious than intermarriage is

threatening my colony. An unusually stormy winter—the partially subsided cliff completes its descent—and all is over.

From information kindly furnished me by Mr. G. S. Tye, I learn that at Tenby where this variety occurs in considerable numbers, there is no appearance of centralisation, but the individuals are to be found scattered among those of typical form like the men of colour in the Northern States. I can suggest no reason for this difference, but merely point it out.



NOTE ON *BULIMUS DETRITUS*.

By PHILIP B. MASON, F.L.S.

More than a dozen specimens of *Bulimus detritus* Müll. were brought to me a short time ago as having been taken from a rockery in a garden in this neighbourhood, where they were living among a number of dead littoral shells gathered at Scarborough; and it was said that the owner of this garden was certain that they had been brought among them. Most of these were living and they were in various stages of growth. However, I think I cleared up the mystery when I ascertained that a quantity of light barley and other seeds which had been screened out of some samples of barley intended for malting purposes had been brought into the garden for the purpose of feeding poultry. I have since procured a specimen of screenings in which were living specimens of *Helix aspersa*.



PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

1880.

33rd Meeting.

Meeting held at Leopold Square, Leeds, the President in the chair.

NEW BOOKS.

The receipt of the Transactions of the Yorkshire Naturalists Union for 1878 was announced.

EXHIBITIONS.

Mr. Roebuck exhibited specimens of *Helix nemoralis*, *Helix arbustorum*, *Helix virgata*, *Helix ericetorum*, and *Helix rufescens*, collected by Mr. C. H. Bothamley at Glentham, New Market Rasen, Lincolnshire, Aug.-Sep., 1879. These were afterwards distributed amongst the members present; as were also several specimens of *Panopæa aldrovandi* from Mr. Darbshire, Victoria Park, Manchester.

—o—

34th Meeting.

Meeting held at Leopold Square, Leeds, the President in the chair.

NEW MEMBER.

Mr. William F. Petterd, Launceston, New Zealand, was elected a member of the Society.

DONATIONS TO THE LIBRARY.

The 'Journal of Conchology' for October, 1879, was presented by the Editor, Mr. J. W. Taylor.

PAPERS READ.

A paper from Charles Ashford, Esq., on "Suggestions for

a serial arrangement of our Banded Land Shells," was communicated by the Secretary. A discussion followed, in which the President and Messrs. Nelson and Scharff took part. A cordial vote of thanks was accorded to Mr. Ashford for his communication.

SPECIMENS EXHIBITED.

Mr. C. Ashford exhibited a number of varieties of *Helix caperata*, *Helix virgata* and *Bulimus acutus* from the Isle of Wight, in illustration of his paper. Also, specimens of *Helix ericetorum* from Clara, King's Co., showing the upper band broken up and diffused transversely; *Helix ericetorum* var. *albida*, Clara, King's Co.; three varieties of *Helix caperata* (including *albida*) from Yarmouth, Isle of Wight; *Helix virgata* monst. *sinistrorsa*, Yarmouth, Isle of Wight; *Helix virgata*, black variety, Afton; *Helix virgata*, white variety, Afton Down; *Bulimus acutus* var. *bizona*, Isle of Wight. The whole series were presented by Mr. Ashford to the Society's collection, and a hearty vote of thanks was given him for his valuable gift.

The President exhibited fine specimens of *Sphærium ovale*, collected by the Rev. W. C. Hey, M.A., at Blue Bridge, near York; also, *Bulimus acutus* of various varieties, *H. caperata* var. *ornata*, &c., and *H. virgata*, varieties from the Isle of Wight, collected by Mr. C. Ashford.

—O—

55th Meeting.

Meeting held at Leopold Square, Leeds, the President in the chair.

DONATIONS TO THE LIBRARY.

The following were announced and thanks voted to the donors:—
Synopsis Molluscorum viventium Testaceorum.

[Dr. W. Kobelt,
Transactions of the Yorkshire Naturalists' Union. Sheet B1.

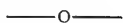
BIBLIOGRAPHY OF YORKSHIRE CONCHOLOGY.

Mr. W. Denison Roebuck announced that he was compiling a Bibliography of Yorkshire Mollusca, and wished to have the assistance of such Members as might be able to refer him to books and papers containing references to Yorkshire Mollusca.

PAPERS READ :

On the local association of *Limnæa glabra*, *Planorbis spirorbis* and *Physa hypnorum*, by Mr. W. Nelson.

Extracts from M. Gassies' paper "On a peculiar hybrid *Rumina decollata* (*Bulinus decollatus*), translated from the "Actes de la Societe Linneenne de Bordeaux."



36th Meeting.

Held at Leopold Square, Leeds, the President in the chair.

NEW MEMBER.

Mr. Edward Collier, 7, Dale Street, Manchester, was nominated for membership.

DONATIONS TO THE LIBRARY.

The following were announced and thanks voted to the donors:—

Remarks on the Geographical Distribution of the Terrestrial Mollusca, by C. P. Gloyne. [The President.

List of Land and Marine Shells of Australasia, by Dr. Jas. C. Cox. [Mr. John Brazier, C.M.Z.S., Sydney.

DONATIONS TO THE COLLECTION.

A valuable and interesting series of Land, Freshwater, and Marine Shells from Australia, numbering 103 species, a list of which is appended. [Mr. John Brazier, C.M.Z.S., Sydney.

Helix meta Pfr., Isabel Island, Solomon Islands.

H. Hombroni Pfr., „ „

H. ambrosia Angas, Savo or Galera, „

H. xanthocheila Pfr., Bougainville, „

- H. deiopsea* Angas, Marau Sound, Guadalcanar, Solomon Islands.
H. Hunteri Cox, Marau Sound, Guadalcanar, Solomon Islands.
H. Malantensis Angas, Florida Island, Solomon Islands.
H. tricolor Pfr., San Christoval Island, „
H. „ var. „ „ „ „
H. leucophæ Cox, Savo or Galera, San Christoval Island, Solomon Islands.
H. gelata Cox, var. *H. Maddoxi* Brazier, Island near Eddystone, Solomon Islands.
H. gelata, light variety of *Maddoxi* Brazier, Island near Eddystone, Solomon Islands.
H. Lambei Pfr., Duke of York Island, near New Ireland.
H. majuscula Pfr., New Ireland.
H. fringilla Pfr., Rubiana, Solomon Islands.
H. Cleryi Recluz, San Christoval, Solomon Islands.
H. Grayi Pfr., Bellenger River, New South Wales.
H. dictyodes Pfr., Canala, New Caledonia.
H. ferriesiana Crosse, Prony Bay, New Caledonia.
H. Abax Marie, „ „
H. Calliope Crosse, „ „
H. Lifouana Montrouzier, „ „
H. Heckeliana Crosse, var. *grammica* Crosse, Prony Bay, New Caledonia.
H. singularis Pfr., Prony Bay, New Caledonia.
Leptopoma Dohrni Ad. and Ang., Savo or Galera, Solomon Islands.
Helicina Moquiniana Recluz, San Christoval, Solomon Islands.
Bulimus Christovalensis Cox, San Christoval, Solomon Islands.
B. palmarum Mousson, Savo or Galera, Solomon Islands.
B. Pancheri Crosse, Prony Bay, New Caledonia.
B. Strangei Pfr., Rubiana, Solomon Islands.
B. porphyrostomus Pfr., Nouméa, New Caledonia.
B. Guestieri Gassies, Kouti Kouti, „
B. duplex Gassies (subfossil), Nouméa, „
B. melo Quoy and G., King George's Sound, S.W. Australia.
Murex Angasi Crosse, Bottle and Glass Rocks.
M. palmiferus Sowerby, „

- Cantharus Australis* Pease, Bottle and Glass Rocks.
Tritonium Australe Lam., „
T. fusiforme Kiener, „
T. Spengleri Chem., „
Ranella leucostoma Lam., „
Nassa Jacksoniana Kiener, Sow and Pigs Reef, 4 fathoms.
N. labecula A. Adams, Bottle and Glass Rocks, under stones.
Zemira Australis Sowb., Lake Macquarie, New South
 Wales (washed on shore after E. and S.E. gales).
Mitra nigra Chem., Bottle and Glass Rocks, Port Jackson.
Purpura succincta Mart., „ „
P. amygdala Kiener, „ „
P. marginalbum De Bl., „ „
Natica plumbea Lam., Rose Bay, on the sands „
N. melastoma Swa., „ „ „
Clanculus Maugeri Gray, Bottle and Glass Rocks, Port
 Jackson, rare under stones.
C. clanguloides Gray, Bottle and Glass Rocks, Port Jackson,
 rare under stones.
C. omalomphalus A. Ad., Bottle and Glass Rocks, Port Jack-
 son, rare under stones.
C. gibbosus A. Ad., Bottle and Glass Rocks, Port Jackson,
 rare under stones.
Trochocochlea concamerata Gray, Bottle and Glass Rocks,
 Port Jackson, rare under stones.
Gibbula picturata Ad. and Ang., Middle Harbour, Port
 Jackson, in rock pools.
Natica conica Lam., Sand Spit, Middle Harbour, Port Jack-
 son, on the sand.
Euchelus baccatus Menke, Bottle and Glass Rocks, Port
 Jackson, under stones.
Gena strigosa A. Ad., Bottle and Glass Rocks, Port Jackson,
 under stones.
Columbella semiconvexa Lam., Bottle and Glass Rocks, Port
 Jackson, under stones.
C. Australis Gaskoin., Bottle and Glass Rocks, Port Jack-
 son, under stones.
C. albomaculata Angas, Sow and Pigs Reef, Port Jackson,
 4 fathoms.
Trochita calyptraformis Lam., Sow and Pigs Reef, Port
 Jackson, 4 fathoms.
Buccinulus affinis A. Ad., Sow and Pigs Reef, Port Jackson,
 4 fathoms.

- Bittium granarium* Kiener, Bottle and Glass Rocks, Port Jackson, under stones.
- Conus Jukesi* Reeve, Bottle and Glass Rocks, Port Jackson, under stones.
- Philippia lutea* Lam., Lake Macquarie, New South Wales, washed up after E. and S. E. gales.
- Adamsia typica* Dunker, Bottle and Glass Rocks, Port Jackson, under stones.
- Ampullarina quoyana* Desh., Double Bay, Port Jackson, on mud flats.
- Cassidula zonata* H. and A. Ad., Double Bay, Port Jackson, on mud flats.
- Pelicularia scutulata* Martyn, Sow and Pigs Reef, Port Jackson, 4 fathoms.
- Lophyrus Australis* Sowerby, Bottle and Glass Rocks, Port Jackson, under stones.
- Lorica cimolia* Reeve, Bottle and Glass Rocks, Port Jackson, under stones.
- Lophyrus concentricus* Reeve, Bottle and Glass Rocks, Port Jackson, under stones.
- Lepidopleurus longicymba* De Bl., Bottle and Glass Rocks, Port Jackson, under stones.
- L. antiquus* Reeve, Bottle and Glass Rocks, Port Jackson, under stones.
- Onithochiton Incei* Reeve, Bottle and Glass Rocks, Port Jackson, under stones.
- Cryptoplax striatus* Lam., Bottle and Glass Rocks, Port Jackson, under stones.
- Chione calophylla* Hanley, Lane Cove River, Port Jackson, 5 fathoms.
- C. striatissima* Sowb., Sow and Pigs Reef, Port Jackson, 4 fathoms.
- Waldhemia flavescens* Lam., Point Piper, Port Jackson, under stones.
- Magasella Cumingi* Davidson, Sow and Pigs Reef, Port Jackson, 4 fathoms.
- Kraussia Lamarckiana* Davidson, Point Piper, Port Jackson, under stones.
- Perna glaberrima* Dunker, Balls Head, Port Jackson, 18 fathoms.
- Bullina lineata* Wood, Sow and Pigs Reef, Port Jackson, 4 fathoms;

- Cylichna arachis* Quoy and G., Sow and Pigs Reef, Port Jackson, 4 fathoms.
Haminia brevis Quoy and G., Sow and Pigs Reef, Port Jackson, 4 fathoms.
Barbatia pusilla Sowb., Point Piper, Port Jackson, under stones.
Neæra rugata A. Ad. (very rare), Sow and Pigs Reef, Port Jackson, 4 fathoms.
Cardita amabilis Desh., Sow. and Pigs Reef, Port Jackson, 4 fathoms.
Scutus anatinus Donov., Bottle and Glass Rocks, Port Jackson, under stones.
Neritina nucleolus Morelet, Canala, New Caledonia.
Glyptophysa Petitii Crosse, Prony Bay "
Marginella translucida Sowb., Sow. and Pigs Reef, Port Jackson.
M. turbinata Sowb., Sow and Pigs Reef, Port Jackson.
Olivella pardalis Ad. & Ang., "
O. leucozona Ad. & Ang., "
Pythia Argenvillei Pfr., Fitzroy Island, N. E. Australia.
Tapes undulata Born., Lane Cove River, 5 fathoms.
Gari Menkeana Reeve, Sow and Pigs Reef, 4 fathoms.
Oliva tigrina Meuschen, San Christoval, Solomon Islands.
Cypræa xanthodon Gray, Bellenger River, N. S. W., found after gales.
Hargravesia polita H. Ad., Duke of York Island, Solomons.

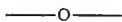
NOTE.—Sow and Pigs Reef, Port Jackson, 4 fathoms.
 Bottle and Glass Rocks, Port Jackson, found under stones.
 Double Bay, Port Jackson, found on mud flats. Lane Cove River, Port Jackson, 5 fathoms mud bottom.

Mr. J. W. Taylor remarked, in reference to Mr. Nelson's paper on the "Association of Species," read at last meeting, that he had received from Mr. Butterell of Beverley a confirmation of Mr. Nelson's views as to *Planorbis spirorbis* and *Limnæa glabra* being usually associated in the same locality. Mr. Taylor pointed out that this association was not invariable, and named several localities where it did not occur.

SPECIMENS EXHIBITED.

Mr. Butterell sent for exhibition a number of *Pisidia* and *Sphæriæ* from the East Riding of Yorkshire; also palates and jaws of *Arion ater*; *Helix aspersa*; *Limnea stagnalis*, *L. palustris*; and *Fusus* sp ?, mounted for microscopic examination; also *Pisidium fontinale* var. *cinerea*, from Manchester.

Mr. W. Nelson exhibited a large number of Yorkshire shells, particulars of which are entered in the Yorkshire Register Book; also *Helix* "*arbustorum*", *H. concinna*; and *Zonites cellarius*, from Glasgow.



57th Meeting.

Held at Leopold Square, Leeds, the President in the chair.

DONATIONS TO THE LIBRARY.

The following were announced and thanks voted to the donors:—

"Journal of Conchology" for November, 1879.

[Mr. J. W. Taylor.

Mounds and Mound Builders in Muscatine County, Iowa,
—a paper read before the Muscatine Academy of Science—by
F. M. Witter.

[The Author.

DONATIONS TO THE COLLECTION.

The following was announced and thanks voted to the donor:—

A collection of Land and Freshwater Shells from Iowa,
numbering 80 species, a list of which is appended.

[Prof. F. M. Witter.

HELICIDÆ.

Helix albolabris—Say.

Helix alternata—Say.

Helix arborea—Say.

Helix clausa—Say.

Helix concava—Say.

Helix hirsuta—Say.

Helix labyrinthica—Say.

Helix lineata—Say.

Helix monodon—Rackett.

Helix monodon, var. *leaii*—
Ward.

Helix multilineata—Say.

Helix profunda—Say.

Cionella subcylindrica—
Linn.

Pupa armifera—Say.
Pupa contracta—Say.
Pupa fallax—Say.
Succinea avara—Morse.
Succinea obliqua—Say.
Succinea ovalis—Gould.

AURICULIDÆ.

Carychium exiguum—Say.

LIMNÆIDÆ.

Limnea desidiosa—Say.
Limnea reflexa—Say.
Physa heterostropha—Say.
Planorbis bicarinatus—Say.
Planorbis deflectus—Say.
Planorbis exacutus—Say.
Planorbis parvus—Say.
Segmentina wheatleyi—Lea.
Ancylus fuscus—Adams.

VALVATIDÆ.

Valvata tricarinata—Say.

VIVIPARIDÆ.

Lioplax subcarinata—Say.
Melantho subsolida—
 Anthony.

Vivipara intertexta—Say.

RISSOIDÆ.

Amnicola cincinnatiensis—
 Anthony.

Amnicola porata—Say.
Bythinella obtusa—Lea.

CORBICULADÆ.

Sphærium sphæricum—
 Anthony.
Sphærium stamineum—
Sphærium transversum—Say
Pisidium compressum—
 Prime.

UNIONIDÆ.

Anodonta edentula—Say.
Anodonta grandis—Say.

Anodonta imbecilis—Say.
Anodonta suborbiculata—Say.
Margaritana complanata—
 Barnes.

Margaritana confragosa—Lea.
Margaritana rugosa—Barnes.

Unio æsopus—Green.

Unio alatus—Say.

Unio anodontoides—Lea.

Unio asperrimus—Lea.

Unio capax—Green.

Unio cornutus—Barnes.

Unio crassidens—Lamarck.

Unio ebenus—Lea.

Unio elegans—Lea.

Unio ellipsis—Lea.

Unio gibbosus—Barnes.

Unio gracilis—Barnes.

Unio graniferus—Lea.

Unio lævissimus—Lea.

Unio ligamentinus—Lamarck.

Unio luteolus—Lamarck.

Unio metenevrus—

Rafinesque.

Unio mississippiensis—Conrad.

Unio occidens—Lea.

Unio orbiculatus—Hildreth.

Unio parvus—Barnes.

Unio plicatus—Barnes.

Unio pustulatus—Lea.

Unio pustulosus—Lea.

Unio rectus—Lamarck.

Unio rubiginosus—Lea.

Unio securis—Lea.

Unio tenuissimus—Lea.

Unio trigonus—Lea.

Unio tuberculatus—Barnes.

Unio triangularis—Barnes.

Unio undulatus—Barnes.

Unio wardii—Lea.

Unio zigzag—Lea.

58th Meeting.

Held at Leopold Square, Leeds, the President in the chair.

NEW MEMBER.

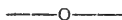
Mr. Edward Collier, 7, Dale Street, Liverpool, was elected a member.

SPECIMENS EXHIBITED.

Mr. Roebuck exhibited a number of shells from the Cleveland and Barnsley districts; also several shells from the Garforth neighbourhood, collected by Mr. Charles Smethurst.

A few specimens from the Canal at Kirkstall were exhibited by the Secretary.

Particulars of all these will be found in the Yorkshire Record Book.

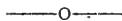


59th Meeting.

Held at Leopold Square, Leeds, the President in the chair.

SPECIMENS EXHIBITED.

Mr. W. Nelson exhibited a large number of shells collected at Bolton Percy, Steeton, Dringhouses, Thorparch, Seacroft, Manston, and Whinmoor.



60th Meeting.

Held at Leopold Square, Leeds, the President in the chair.

PAPER READ.

"*Bulinus acutus* var. *bizona*," by Mr. Charles Ashford.

EXHIBITS.

Yorkshire Shells from various localities were shown by Mr. W. Denison Roebuck, of which particulars will be found in the Record Books.



NOTES ON *BULIMUS HETEROSTOMUS* OF THE EOCENE, ISLE OF WIGHT.

By CHARLES ASHFORD.

(Read before the Leeds Geological Association.)



Edwards' figure of this species (v. Eoc. Moll., t. xiv., f. 1) is from an imperfect specimen of which the four latter whorls only are preserved, and I know of no other. Having been so fortunate as to meet with an almost perfect example of this little fossil *Bulimus* in the Bembridge limestone of the I. of W., I am enabled to supplement to some extent both the figure and description in that author's Monograph.

My best specimen occurred in hard limestone, fracturing dark grey. The cleavage was a very fortunate one exposing the entire shell in the line of axis, and exhibiting a posterior view of a matured and unbroken peristome. The test moreover is in fair preservation except on the fifth and last whorls, where small portions have come away in the separation of the rock.

The author of Eoc. Moll. gives the following description of the species inferred I presume from the imperfect cast and the marks of striation remaining in the matrix. The italics are mine. —“A small conical shell, with an elevated, tapering, pointed spire, *the apex of which is subject to decollation*; the seven or eight

whorls of which it is formed are rounded, separated by a *deep suture*, and ornamented with fine, transverse, raised lines, which are numerous, regular and very oblique; the aperture is roundly-ovate, apparently thickened within, and with the margin *slightly reflected*, . . .” and he ends by remarking “apparently it is very rare.” I offer a few remarks on this description.

Among the four examples of *B. heterostomus* which I have found in this neighbourhood, there is no instance of decollation of the apex. One is immature and therefore not likely to be so affected, but the other three are either almost or completely of full growth. From this it may be inferred that the defect was exceptional, and that the geologist has as good a chance of meeting with a complete spire as with one that has shed its early whorls. Spiral shells occurring in the limestone at Sconce are very frequently found with the upper or early whorls in an empty state into which moisture charged with lime-carbonate has percolated, forming incrustations of crystals. In extracting the fossil this brittle structure at the apex comes away in fragments or as frequently flies away unseen when the rock is splintered and an apparently decollated specimen only is secured, but the complete form may be observed in the matrix. I do not suppose for one moment that the author of Eoc. Moll. was deceived by this appearance, though a less careful observer might easily be led into error. His figure of the matrix seems not to show the apex of the shell but to suggest a true case of decollation. My own specimens were obtained from a different locality, viz.:—the uplands of Thorley, where the embedded organic remains are generally found filled to the very apex, and where it is not uncommon to meet with examples of *Helix*, *Planorbis*, *Limnæa*, &c., with the shell preserved though in a white and very friable condition.

The whorls are eight in number, *gradually increasing in size*,

the last two occupying half the length of the axis. Edwards' remarks (l. c.) "the shell has so much the appearance of *Truncatella* that I should be disposed to refer it to that genus" but for other considerations. Reference to my complete figure above disposes at once of this supposition. There is no appearance of truncation, the increase of the whorls from apex to base being gradual and regular.

The suture as seen in casts (which really represent the form of the interior of the shell) is certainly "deep" but when the shell is present the suture is not so pronounced in character, nor are the whorls so convex.

The striation is well described. I will only add that the first whorl—as is so frequently the case in recent shells—is quite smooth. In an immature specimen which shows the lines more distinctly, I count about 90 on the fourth whorl; of these every third or fourth or fifth is more raised than the intermediate ones. The striae on the later whorls become rather coarser especially as they approach the inferior suture.

The aperture is described in the Monograph as having the margin "slightly reflected." The figure (l. c.) appears to represent a portion of an adult shell with the aperture but partially formed. When fully developed the margin of the peristome is *broadly and boldly reflected*, so much so as to form a striking feature of the species. The Latin diagnosis should therefore read—peristomate valdè reflexo.

The umbilicus is displayed in only one of my specimens. Judging from the cast it may be described as small but conspicuous and partly covered by the reflected lip, but allowance must be made for the presence of the shell which would lessen its diameter.

Length 8 mil., breadth about 4 mil., which agree closely with the dimensions given in the Monograph.

NOTES FROM THE ISLE OF WIGHT.

By CHARLES ASHFORD.

(Read before the Conchological Society.)

Helix virgata.—For some reason not apparent, atmospheric conditions last year were unfavourable to molluscan life in the west of the Island. The diminished number of individuals not only of this species but of others usually abundant was very marked, as well upon the hedges inland as upon the Downs. Continued heavy rain and persistent drought are inimical to *H. virgata*, but neither of these formed the feature of the summer or autumn. A pretty variety with a single dotted cincture below the suture and a depressed spire occurs in one field under Afton Down, nearly all the individuals partaking more or less of the peculiarity. Another variety of a uniform purple-brown colour, sometimes wholly black, seems to be chiefly confined to a few square yards near the sea-cliff. The prevailing plant there is *Carduus tenuifolius*, upon the stems and leaves of which it is to be found associated with typical forms. These facts confirm the opinion that such peculiarities are hereditary. The small conical variety, *submaritima*, appears never to occur away from the Downs. Bouchard-Chantereaux says (Brit. Con. i. 212):—"Helix virgata does not seem to mind the cold and never hibernates." I cannot confirm this statement. During the winter of 1879 I repeatedly looked for this species and *B. acutus* but could find none alive. Numbers of shells dotted the ground, but examination shewed them all to be untenanted.

Helix caperata.—This again, though abundant in 1879, was positively scarce last year. Along a hedge-row, where I once

selected the most beautiful specimens out of hundreds, attached to the leaves upon which they had fed during the night, I saw scarcely half-a-dozen individuals last summer, and in other spots they were equally scarce.

Helix nemoralis var. **hortensis**.—This shell grows to a large size near Yarmouth, exceeding the average dimensions of the specific form. I have taken specimens 24.5 to 23 mm. in breadth (nearly an inch). The var. *hortensis* is evidently spread over the Freshwater peninsula, while *H. nemoralis* is very local. I have observed the latter only on the north side of Hempstead Hill and in one spot above Colwell Bay.

Helix rufescens.—Both at Ventnor and in the west of the Island the shell of this species is generally light in color. Under a wall of Thorley Farm I have taken several beautifully white specimens, the others with them being much paler than usual. It would appear, therefore, that a tendency to albinism is hereditary.

Helix cantiana.—Another species which was seen in greatly diminished numbers last season. It is said (Venables' Guide, p. 463,) to occur "mostly on the Chalk," but at the western end of the Island I find it only on the Tertiaries. The rufous and white varieties are never found in separate communities.

Helix rotundata.—An individual in a metal box laid two eggs in July. These were white, opaque and ellipsoidal, the ratio of the two diameters being about the same as in eggs of the Tawny Owl.

Helix aspersa.—As an instance of the extent to which our shelly friends fall a prey to our no-less favourite songsters, I may mention the following. In one of my winter walks I passed a ditch recently cleared out revealing a post, behind which were

some 20 or 30 individuals of this species in hibernation. Marking the spot, I returned the next day to examine them in detail, when I found the whole community devoured. The shining fragments of their broken shells covered the ground a yard or two from the post. In the the midst of the *débris* was the altar-stone of immolation, much stained. Lister says (speaking of *H. nemoralis*) that thrushes pierce the upper part of the shell with their beaks. I once, and only once, witnessed the operation. Seizing the shell by the lip, the bird struck it several times forcibly on the stone till the spire was well broken. It made no attempt to pierce it with its beak. The smeared state in which such stones are left inclines me to believe that the process I have described is the usual method adopted. [From our own experience we are able to confirm the correctness of the above interesting observation, the bird in our case being the Thrush.—EDS. J.C.] The love-darts of *H. aspersa* are four-edged assegais or spear-heads. There is a central axis, generally slightly curved, of opaque lime carbonate, round which the four blades are symmetrically arranged, the latter being thin, semitransparent and simple-edged. A round contracted neck unites the blade-stem to the knob by which the weapon is originally attached to the dart sac. This knob is roughly hemispherical or subconical and hollow as if to receive a ligament. The four-fold blade however does not seem to be a constant characteristic. I have one in which I can detect only two edges like an ordinary spear head.

Vertigo minutissima.—Hitherto I have failed to find this little fellow at the western end, but I have taken it among disintegrated stone rubbish under Steephill, near Ventnor.

Bulimus acutus.—The diminution in this species in point of numbers was very perceptible last year. It is chiefly

confined to the southern slopes of the Downs, and seems to spend the greater part of its day in social amenities.

Balia perversa.—This is not uncommon near Ham Copse attached to the bark of beech and other trees during dry weather. It also retires to the under side of fallen timber, associating there with *Zon. cellarius*, *Cl. rugosa*, *H. rotundata* and *Coch. lubrica*. The last four are frequently found together in similar situations.

Arion ater (?)—A very peculiar variety of this variable slug occurred on a hedge by the Yarmouth and Freshwater road. It differed from the typical form not only in color (no unusual circumstance), but also in the apparent absence of tubercles on the skin and the comparatively small bulbs of the tentacles. I append a description from my notes :—*Respiratory orifice* at the rear of the preceding third of the shield. *Body* gradually tapering, light grey, slightly freckled with brown down the dorsal line ; skin not tubercled, tight and smooth, marked longitudinally with bluish vein-like pencillings ; neck bluish grey. *Shield* long-yellowish in front, grey behind, darkly spotted on the upper part with brown, less so at the tip leaving an ill-defined whitish patch in the centre. *Tentacles* upper pair rather long, conical, dark bluish-grey, surmounted with very moderate bulbs ; lower pair comparatively very short. *Keel* none. *Foot* orange yellow in front, very light lavender grey behind, with a bright deep-orange fringe the whole length. *Shell* not to be found. Length, about four inches.

LIST OF THE LAND AND FRESHWATER SHELLS
FOUND AT HORNSEA, JULY, 1880.

By J. D. BUTTERELL.

- Arion ater*. Common.
A. hortensis. Common.
Limax agrestis. Very common.
L. maximus. In cellars and outhouses.
L. flavus. In cellars. Rather common.
Succinea putris. In damp places. Common.
Vitrina pellucida. In woods, near Hornsea Mere.
Zonites cellarius. In woods, plentiful under decayed wood.
Z. alliarius. In woods, sparingly.
Z. purus. In woods, sparingly.
Z. nitidus. In marshy places near the Mere, plentiful.
Z. nitidulus. Hedgerows, not frequent.
Helix aspersa. Extremely abundant, especially near the sea.
H. nemoralis. Very common.
H. hispida. Frequent.
H. virgata. Cliffs and hedgerows near the sea, abundant.
H. virgata. Monochrome variety, approaching var. *carinata* in form. Extremely plentiful near the sea.
H. caperata. On thistles and herbage on the low lying cliffs near the promenade, very common.
H. caperata var. *ornata*. With the last, less common.
H. ericetorum. In a field near the sea.
H. pulchella. Under moss in a field near the Mere.
Cochlicopa lubrica. Woods near Hornsea Mere.
Carychium minimum. Woods nr. Hornsea Mere, common.
-
- Pisidium pusillum*. Ditch near Wassand end of the Mere.

Pisidium roseum. Hornsea Mere.

Sphærium corneum. Ditch near Hornsea Bridge, Hornsea Mere.

Anodonta cygnea. Hornsea Mere, abundant.

A. anatina. With the last, both species very variable in size.

Planorbis complanatus. In ponds, fine, Hornsea Mere.

P. carinatus. Hornsea Mere.

P. vortex. Hornsea Mere.

P. spirorbis. Ditch in a field near Wassand, plentiful.

Limnæa peregra. Generally distributed but not very abundant.

L. truncatula. Ditch near Hornsea Mere.

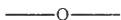
L. palustris. In ditches and swampy places near the Mere.

Physa fontinalis. Ditch near Wassand.

Bithynia tentaculata. Ditch near Hornsea Bridge.



Note on *Planorbis corneus*.—I have recently taken a number of specimens of *Planorbis corneus* (from Spring Dyke, near Hull), with the animal of a bright pink or crimson tinge, similar I imagine to those found by Mr. Nelson some time ago, the shell also had a reddish tinge.—J. D. BUTTERELL.



Note on the Shells in the neighbourhood of Bristol.—I do not know whether you will consider the following localities, that as far as I can ascertain do not appear to have been before recorded, worth noting in the Journal of Conchology, the shells were taken last year. *Limnæa stagnalis* var. *fragilis*, River Frome, Stapleton, Bristol. *Pisidium pusillum* var. *obtusalis*, Avonmouth, Bristol. *Conovulus denticulatus* var. *myosotis*, River bank near Pell, Bristol.—JAS. W. CUNDALL.



PROPOSED SYSTEM OF CONCHOLOGICAL
LOCALITY-RECORDS.

By WM. DENISON ROEBUCK.

(Read before the Conchological Society.)

The study of geographical distribution is now fully recognized as one of great importance, especially as looked upon from the stand-point of the most recent developments of scientific research. There will, therefore, I think, need no words from me to demonstrate its value.

But it seems to me that all generalizations in this direction should—to ensure their full value being secured—be founded upon a basis sufficiently broad and sufficiently accurate to warrant the conclusions which we draw. Any suggestions, then, that would tend to secure these indispensable requirements will, I believe, receive from the Conchological Society careful study and earnest attention.

Having lately seen something of the working of the Botanical Record Club, I thought a series of suggestions based upon its rules and practice, more especially with respect to the cryptogamic portion of Botanical science, would be of service to conchologists.

The object of the Club is to collect reliable data for ascertaining the range and distribution of plants, and the elimination of every possible source of error while doing so. The first object they attain by publishing in their reports a series of county floras, and the elimination of error they secure by making it a stringent and inviolable rule that every species in the lists shall be vouched for by a specimen sufficiently good to permit of the identification of the species or variety.

There is not the slightest doubt that errors creep into

published lists from various reasons, one of the most common being the imperfect determination of the species, and another being the reliance of some writers on their memory. Both these sources of error are obviated by the insisting on the fundamental rule that a specimen accompany the record, such specimen becoming the property of the Club, and, in the case of the Botanical Record Club, eventually passing into the custody of the National Herbarium at Kew.

Members are desired to forward records from time to time, and, when duly authenticated and passed by the referees, under whose scrutiny all critical species pass, are published—the practice of the Botanical Club being to let such accumulate till a list of 50 or more is ready. This power is unnecessary, and records may be printed as they come in.

A necessary consequence, and indispensable accompaniment of the voucher-specimen principle, is the appointment of skilled and competent referees—in the Botanical Club these posts are filled by the best Botanical specialists of the day, and if such a scheme were adopted for Conchology it would be necessary to invite the best Conchologists of the time to act as referees for their own special groups. I would, therefore, make the following suggestions :—

1.—That it is desirable that the Conchological Society should commence a system of recording the localities of British mollusca.

2.—That it be an indispensable requirement that every record be accompanied by a voucher-specimen, or specimens, sufficiently good to permit of the safe identification of the species.

3.—That the best Conchologists of the day be invited to act as Referees—each in his own special branch or group.

4.—That Mr. H. C. Watson's map of the British Isles and his division into 18 provinces and 112 counties be adopted as the basis on which to frame county lists—this suggestion being intended to facilitate subsequent tabulation of results.

5.—That Conchologists be invited to contribute lists for the different districts shown on Mr. Watson's map, subject to the indispensable requirement of a voucher-specimen for each record.

6.—That in the case of extremely rare or unique species or varieties, the voucher-specimens, after being submitted to the referee, may be returned to the collector, instead of being retained for the Club collection; but that all other specimens be so retained.

7.—That it is desirable that, as soon as practicable, a new and authentic list of British mollusca, showing provincial distribution by figures, be prepared as a standard of nomenclature—there having been several corrections of errors and additions of new species and varieties made since the publication of Dr. Jeffreys' book.

8.—That the Editors of 'The Journal of Conchology' be requested to accept as material for publication therein such records and county-lists as may be contributed in response to these suggestions.

Should the Conchological Society do me the honor to look favourably upon these suggestions, I should propose that a brief abstract of them be published in the Journal, and at the same time invite (through the same medium) Conchologists to co-operate with the Society in carrying out such a scheme for the ultimate benefit of Conchological science. The result would be, I am sure, the collection of a large quantity of thoroughly *reliable*, because *properly authenticated*, facts. And when a considerable number of such county-lists were published, the Journal would be a storehouse of material upon which extensive generalizations might be safely founded.



PROPOSED "MONOGRAPH OF THE UNIONIDÆ OF NORTH AMERICA."

We hail with pleasure the announcement by Mr. Arthur F. Gray, Danversport, Massachusetts, and Mr. R. Ellsworth Call,

Dexter, Iowa, that they have in course of preparation a "Monograph of the Unionidæ of North America." The want of such a work has been long felt, and we sincerely trust our brother Conchologists of America will, with their characteristic ardour and readiness, give that hearty co-operation in providing the necessary material, &c., for the effective carrying out of the undertaking. The prospectus, a copy of which we have been favored with, says :—

"All aid will be acknowledged in due form ; and, to parties desiring it, liberal exchanges will be given. It is designed to figure the anatomy of every species in detail, and to this end shells with their animals should be carefully preserved in alcohol—from three to five specimens of each species—and a careful record of date of capture and locality kept.

"Your special attention is called to the physical geography of the area included within the field of your operations, and to the fact that the value of your collections will be increased by the inclusion of a great variety of stations. By the comparison of the results of such careful examinations it is hoped that an accurate knowledge of the distribution of the *Unionidæ* may be obtained, together with the effect of environment on their habits, growth and economy. Such observations, it is notorious, have been either loosely or not at all recorded. Your co-operation is respectfully requested in the preparation of local lists, where you have not the specimens to spare, which shall include a record of the name of stream, nature of bottom, force of current, nature of the water, add associated species of univalves. Aberrant and peculiar forms are especially desired.

"On small parcels, to be sent by mail, postage will be remitted on notification of the amount. Boxes and heavy parcels may be sent by express at the expense of the consignee. It is unnecessary to add that the completeness and value of the proposed work will depend largely upon the response made by the conchologists of America, which, it is hoped, will be liberal. A large mass of interesting and valuable notes must exist in the hands of those who study these forms, which, if sent to us, will find a place in the Monograph, carefully attributed to their respective observers."

DESCRIPTIONS OF NEW SPECIES OF LAND SHELLS
FROM THE EAST COAST OF AFRICA.

By JNO. W. TAYLOR.

In continuation of former papers on this subject, based on the collections formed by Mr. Gibbons in East Africa, and which he kindly placed in my hands for identification, I have now added five more species to those previously enumerated.

The whole collection is of great interest, and I have experienced considerable pleasure in the task of examination—a pleasure that has been greatly intensified by the very full and accurate descriptive notes kindly furnished me by Mr. Gibbons.

***Helix dubia*, n. s. (Pl. i, f. 1.)**

Shell depresso-conical, thin, color brownish?—faintly marked in the line of growth with striulæ: epidermis thin, distinct: whorls $4\frac{1}{2}$, convex, gradually increasing in size to the last, which is subcarinate, base very convex, spire depressed, apex obtuse: suture distinct: mouth lunate, peristome thin and direct, rounded—inner lip slightly reflected behind: umbilicus narrow but deep and distinct.

Length, 0.112; breadth, 0.087.

Occurs rather numerously among grass in a sandy place at Zanzibar. I have not seen any live shells.

***Bulimus Bawriensis*, n. s. (Pl. i, f. 2.)**

Shell ovate-conical, somewhat turrite, moderately strong, of a dark brown color and very finely striulate transversely: epidermis moderate: whorls $5\frac{1}{2}$ to 6, very convex, inflected towards suture, gradually increasing in size downwards—the penultimate and body whorls are both large—the latter however rather the larger: spire produced: apex rounded, small: suture distinct: mouth oval, longer than broad: peristome thickened—everted so as to form a broad flat margin—presenting

ing the appearance of a double peristome : umbilicus deep and distinct.

Length, 0.175; breadth, 0.087 in.

Found a few dead specimens on Bawri Island, Zanzibar Channel. Appears to be peculiar to the island; it occurs in old shells among dead leaves.

The next two species form with this a section, in which are some Australian *Bulimi*. *B. Pacificus* Pfr., from Queensland, appears almost exactly like the above species, but is probably distinct.

***Bulimus Zanguebaricus*, n. s. (Pl. i, f. 3.)**

Shell ovato-conical, inclining to turrite, moderately thick, of a light brown color, very faintly striulate transversely: epidermis rather thin: whorls $6\frac{1}{2}$, tumid, inflexed towards suture, gradually enlarging towards body whorl which is the largest of all—the penultimate and preceding whorls are nearly equal in size; apex small and rounded: suture deep and distinct: mouth rotundo-ovate nearly as broad as long: peristome thin, everted: inner lip short, reflected a little outwards behind: umbilicus small but deep and distinct.

Length, 0.162; breadth, 0.075.

Numerous dead among grass in a sandy spot down the coast of Zanzibar, in company with numerous other land shells.

This is very closely allied to the last, but may be distinguished by its smaller and more slender shape, by being thinner, and by having the peristome less everted and solid.

***Pupa turricula*, n. s. (Pl. i, f. 4)**

Shell short, broad, fusiform pointed, moderately thin, ornamented with close, regular, transverse and raised striæ, those on the ultimate whorl being much larger and further apart: color brownish: whorls 8, very convex, behind they are flattened and inflexed towards the suture—the last whorl is deep but considerably contracted in breadth, the turn preceding the penultimate is the broadest, the others narrowing rapidly in each direction from it; the spire of about

four whorls is produced and hardly distinguishable from the rest of the shell, it tapers rapidly to an acute point: suture deep, barely oblique: mouth ovato-triangular, small and vertical, as broad behind as high; peristome white, reflected outwards, internally thickened and forming several teeth, viz. :—a parietal plate, thin triangular, commencing at the inflexed end of the outer lip and running somewhat obliquely inward, palatal teeth two in number, one a large obtuse tubercle about the middle of the outer lip and opposed to the parietal plate; the second anterior, small, deeply seated, sometimes undistinguishable: columella bears one triangular tooth about the middle and a deeply seated tubercle at the angle: umbilicus distinct, somewhat tubular.

Length, 0·135; breadth 0·075.

Rare (dead only) at Zanzibar, among grass and bushes, with other shells.

Pupa (Ennea) sex-dentata, n. s. (Pl. i, f. 5.)

Shell cylindrical rather narrow, very faintly striulate obliquely, whorls 7, flattened, inflexed behind, the last considerably enlarged, rounded, the next three about equal in size, flat, sharply inflexed towards suture posteriorly, spire of about 3 whorls depressed, apex distinct: suture oblique; very deep and distinct: mouth rather lateral, large, quadrate, as broad as high, peristome reflected outwards, internally thickened, teeth six in number, parietal plate arises from inflexed end of outer lip and runs obliquely inwards, curved a little towards the columellar side, palatal teeth two, very distinct, sharp and triangular, columellar teeth are two conical sharp-pointed tubercles arising from a common base about the middle; another smaller and also pointed, arises from anterior end of aperture: umbilicus deep and tubular.

Length, 0·19; breadth, 0·075.

Found but one specimen at Zanzibar among other *Pupæ*, &c.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

1880.

61st Meeting.

Meeting held at Leopold Square, Leeds, the President in the chair.

NEW MEMBER.

Mr. James Cosmo Melvill, M.A., F.L.S., of Kersal Cottage, Prestwich, was nominated for membership.

PAPERS READ :

"Note on *Bulimus Goodallii*, Miller," by Mr. Charles Ashford.

A paper from Mr. J. D. Butterell: "List of shells collected at Hornsea."

Mr. W. Nelson stated that Mr. Smethurst, while beating the birch trees for larvæ in West Woods, near Bramham, and Bishop's Wood, near Selby, had beat out *Helix aculeata*.

SPECIMENS EXHIBITED.

The President exhibited *Helix ericetorum*, *H. pulchella* and *Pupa marginata* from St. Cloud, Paris ; also, *Helix virgata* from Brighton, and *Helix sericea*, *H. rotundata*, *H. rufescens*, *Cochlicopa lubrica*, and *Cochlicopa tridens*, var. *crystallina*, from Ilkley.

Messrs. Nelson and Roebuck exhibited Yorkshire shells from various localities, particulars of which are entered in the Yorkshire Record Book.

Mr. Nelson further exhibited a fine series of shells recently obtained at the Isle of Man, a list of which is appended :—

Pisidium sp. Scarlet Point.

Limnæa peregra near Poyllvaish Bay, Ballakinnish and Balladoole, Scarlet Point, and Stream, near Castletown.

Limnæa truncatula Scarlet Point.

Ancylus fluviatilis near The Nunnery, Douglas, Port Soderic, and Scarlet Point.

Zonites cellarius near The Nunnery, Douglas, Port Soderick and Scarlet Point.

Helix aspersa Port Erin and Scarlet Point.

Helix nemoralis Ballameenagh, Ballasalla, Scarlet Point, and Willaston.

Helix caperata Scarlet Point and Onchan.

Helix hispida Scarlet Point.

Helix rotundata Scarlet Point, Onchan, Douglas Head, near The Nunnery, Douglas.

Helix rupestris Scarlet Point.

Bulinus acutus Scarlet Point.

Clausilia rugosa near Douglas Head.

Cochlicopa lubrica Onchan.

Pupa marginata Scarlet Point.

Pupa umbilicata Scarlet Point, Castletown, Peel Castle, The Nunnery, and Douglas.

Also the following from Furness Abbey:—

Zonites cellarius, *Z. alliarius*, *Helix hispida*, *H. rotundata*, *H. pulchella*, *Clausilia rugosa*, *Pupa umbilicata*, *Cochlicopa lubrica* var. *lubricoides*.

The Secretary (Mr. Thos. W. Bell,) exhibited a few shells collected at different localities near Peterborough. The following is the list:—

Dreissena polymorpha Thornley, Cambridgeshire.

Anodonta cygnæa Newborough, Northamptonshire.

Spherium corneum Newborough, Eye, and Peterborough.

Neritina fluviatilis Thornley.

Paludina contecta Eye and Newborough.

Bithinia tentaculata Peterborough, Eye, Newborough, and Thornley.

Physa fontinalis Eye and Newborough.

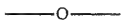
Planorbis corneus Peterborough, Eye and Newborough.

P. vortex " " "

P. complanatus " " "

P. carinatus Eye and Newborough.

- Planorbis contortus* Eye and Peterborough.
P. albus Peterborough.
Limnea stagnalis Peterborough, Eye and Newborough.
L. peregra " " "
Zonites (young sp.) Eye.
Helix aspersa Peterborough, Eye, Eastfield, &c., &c.
H. nemoralis Peterborough, Eye, Newark, Thornley, &c.
H. hortensis " " "
H. hortensis var. *hybrida* Eye, Dogsthorp and Eastfield.
H. arbustorum Eye, Newark, Peterborough, &c.
H. ericetorum Newark and Eye.
H. caperata Eye.
H. rufescens Eye.
H. hispida Thornley and Eye.
H. rotundata Eye.
Succinea putris Peterborough, Eye, Thornley, and Newborough
S. elegans Peterborough, Eye and Newborough.



62nd Meeting.

Held at Leopold Square, Leeds, the President in the chair.

NEW MEMBERS.

Mr. James Cosmo Melville, M.A., was elected a member of the Society.

Mr. G. Sherriff Tye, Villa Road, Handsworth, Staffordshire, was nominated for membership.

SPECIMENS EXHIBITED.

Mr. Wm. Nelson exhibited a fine series of land and freshwater shells collected during a recent tour through Dovedale, Derbyshire.

Mr. W. D. Roebuck showed a number of specimens (including *Planorbis corneus*) from Yorkshire localities; and the Secretary also exhibited *Limnea peregra* from Caverley Carr, and *Bulimus acutus* var. *bizona*, collected by Mr. C. Ashford, from Freshwater, Isle of Wight.

A collection of shells (West Africa and West Indies), numbering about 54 species, was exhibited from Mr. J. W. Cundall, Bristol.

—o—

63rd Meeting.

Held at Leopold Square, Leeds, the President in the chair.

DONATIONS TO THE LIBRARY.

The following were announced and thanks voted to the donors:—

“Transactions of the Yorkshire Naturalists’ Union.”—Part 3.

Reprints of Papers published in the “Proceedings of the Linnean Society of New South Wales, vol. iv.,” by Jno. Brazier, C.M.Z.S., namely:—

1.—“Synonymy of, and remarks upon, Port Jackson, New Caledonian and other shells, with their distribution.”

2.—“List of land shells found on Thursday Island, with descriptions of the New Species.”

3.—“List of Brachiopoda or Lamp Shells found in Port Jackson and the coast of New South Wales.”

4.—“Tropical Mollusca recently dredged at Port Jackson Heads.”

5.—“Note on *Oniscia ponderosa*, with its locality.

[The Author.

Reprint of paper published in the “Science News,” April 15, 1879:—“*Littorina littorea*, L., on the American coast,” by Arthur F. Gray.

[The Author.

PAPER READ.

Note from Mr. J. D. Butterell reporting the discovery of a white variety of *Succinea elegans*.

SPECIMENS EXHIBITED.

Mr. W. D. Roebuck exhibited a series of shells collected by Mr. W. E. Clarke at Holderness.

The President exhibited a number of interesting shells received through the courtesy of Mrs. Fitzgerald of Folkestone, viz. :—

Helix planospira from Cortona.

H. nemoralis from Lindan, Lake Constance.

Clausilia dubia from Cortona.

C. Stentzii „

Bulimus detritus var. *radiatus* from Wurzburg.

Bythinia tentaculata from River Rhine at Cologne.

Helix concinna var. *minor* from Folkestone.

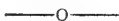
Succinea Pfeifferi Rossm. „

Hyalina Draparnaldi Beck. from Bristol.

The two latter have been identified by Dr. Bottger, of Frankfort, and are stated to be new to England. The *Hyalina* was discovered by Miss Hele, and the *Succinea* by Mrs. Fitzgerald.

NEW MEMBER.

Mr. G. S. Tye, Villa Road, Handsworth, Staffordshire, was elected a member of the Society.



64th Meeting.

The Annual Meeting of the Society was held in Leopold Square, Leeds, the President (Mr. J. W. Taylor) in the chair.

After the transaction of some routine business, the Secretary proceeded to read

THE ANNUAL REPORT FOR 1880.

In presenting this Report the Committee are glad to be able to state that considerable progress been made in the Society's work during the year.

MEETINGS.

The ordinary monthly meetings for members have been

regularly held. At these meetings the

PAPERS READ

have been of considerable interest. The list includes papers by Charles Ashford, Esq. :—

“On suggestions for a serial arrangement for our banded land shells.”

“Note on *Bulimus acutus* var. *bizona*.”

“Note on *Bulimus Goodallii*.”

Wm. Nelson, Esq. :—

“On the local association of *Limnæa glabra*, *Planorbis spirorbis* and *Physa hypnorum*.”

R. Scharff, Esq. :—

“Extracts from M. Gassies’ paper, ‘On a peculiar hybrid *Rumina decollata*’ translated from the Actes de la Societie Linnéenne de Bordeaux.”

J. D. Butterell, Esq. :—

“Note on the discovery of a white variety of *Succinea elegans*.”

“List of shells collected at Hornsea.”

SPECIMENS EXHIBITED.

The number of shells exhibited has been very large and has comprised some rare and valuable specimens. The list includes :

A fine series of banded-shells illustrative of Mr. Ashford’s paper. Collections (including some rare species and varieties) from Isle of Man and Dovedale, by Mr. W. Nelson.

A collection of 54 species from West Africa and the West Indies, by [Mr. J. W. Cundall.

A series of Continental and British shells, some of which had been sent by Mrs. Fitzgerald, Miss Hele, and Mr. J. H. Ponsonby. [The President.

Mr. Roebuck exhibited on behalf of Mr. J. D. Butterell, a series of microscopic slides of the jaws and tongues of various mollusca. List :—

Limnæa peregra. Beverley, 1880. Jaw and odontophore.

<i>Limnæa stagnalis</i> .	Spring Dyke, 1880.	Odontophore.
<i>L.</i>	"	Beverley, 1880. Jaw.
<i>L. palustris</i> .		Palate.
<i>Planorbis corneus</i> .	Beverley, 1880.	Jaws and odontophore.
<i>Neritina fluviatilis</i> .		Odontophore.
<i>Ancylus lacustris</i> .		"
<i>Arion ater</i> .	Beverley, 1880.	Jaws and odontophores.
<i>Limax agrestis</i> .	"	"
<i>Succinea putris</i> .	"	"
<i>S. elegans</i> .	Pighill Lane, Beverley.	"
<i>Helix aspersa</i> .	Beverley, 1880.	"
<i>H. caperata</i> .	"	"
<i>H. hispida</i> .	"	"
<i>H. rufescens</i> .	"	"
<i>H. virgata</i> .	"	"
<i>H. arbustorum</i> .		"
<i>H. cantiana</i> .	"	"
<i>H. hortensis</i> .	"	"
<i>Pupa umbilicata</i> .	Walkington, 1880.	"
<i>Littorina litorea</i> .		Palate.
<i>L. obtusata</i> .		Odontophore.

Mr. Butterell's letter drew attention to the jaws of *Limnæa stagnalis* and *Planorbis corneus*. It was seen that in *L. stagnalis* the side pieces hanging from the jaw are covered with filaments, and the question arises in the mind whether these are intended to prevent too large pieces entering the mouth or to retain what is there—in fact, to act somewhat in the manner of the whalebone in a whale's mouth, *i.e.*, as a strainer. In the action of eating, the odontophore moves up to the jaw and the hanging side pieces close in both sides. Mr. Butterell's letter closed by asking for informations from the members, as he has not seen the subject treated in any of our books.

THE RECORDER'S REPORT.

Mr. Wm. Denison Roebuck presented his report as Recorder of the Society of the Yorkshire localities of shells, which is appended hereto :—

“The Recorder of Yorkshire Localities has to report that during the year 1880 specimens have been shown at the meetings in authentication of 204 localities for 58 species and varieties of land and freshwater shells. The numbers at present standing on record in the books, including the entries made not only in 1880 but in all preceding years, are :—1,104 records for 128 species and varieties, giving an average of rather more than eight records for each form. Four species and varieties have been shown during the year for the first time. The Recorder would conclude by reminding members and others that the aim of the Record Book system is to afford a well authenticated source of information on geographical distribution. To this end no record is admitted unless the specimens are shown at the meetings, and the determination verified by competent authority. For the complete attainment of this object the co-operation of all collectors is needed. Instead of the localities averaging eight for each form, there should be hundreds ; and shells from every part of Yorkshire, of all species, even the commonest, should be sent for exhibition, and for the furtherance of a scientific object which is so well carried out by the Botanical Record Club.”

LYMNÆA PEREGRÆ VAR. *PICTA*, IN DERBYSHIRE.

BY REV. HERBERT MILNES, M.A.

In one of my conchological excursions in the North of Derbyshire, I dredged from a small pool in the neighbourhood of Winster several specimens of *Lymnæa peregræ* var. *picta*. As I am not aware of its being recorded as taken before in Derbyshire, I have thought it might interest some of the readers of the Conchological Journal to hear of its occurrence.

**Manual of Conchology, structural and systematic,
with illustrations of the species.—Vol. I.—II.**

By GEORGE W. TRYON, JUNR.

This important work, of which two volumes lie before us, aims to be the most useful and comprehensive on Conchology that has yet been issued. The distinguished author, G. W. Tryon, junr., is well known by his many able articles on North American Mollusca, and also by his connection with the "American Journal of Conchology," which periodical he edited for many years.

The author has exceptional facilities for the compilation of a work of this nature by his connection with the Academy of Sciences of Philadelphia, the Conchological Museum of which Institution ranks among the largest in the world in the species represented, while its series illustrating variation and geographical distribution are probably unrivalled. Its library contains almost every work ever published on the subject, as well as Transactions of learned bodies, &c.

It is intended to figure every genus and every recent species—so far as specimens or hitherto published figures will enable it to be done—and it is estimated that 30,000 or 40,000 illustrations will be required.

The First Volume is devoted entirely to the Cephalopoda, for the illustration of which group 112 plates are required, representing the fossil and recent species, with details of anatomy, embryogeny, &c. The volume is closed by a very complete alphabetical index of the species cited, giving the synonymy and a very full description of the numerous plates illustrating the Monograph.

The Second Volume of this beautiful work is devoted to the Muricinæ and Purpurinæ, and is illustrated by 70 plates,

fully elucidating the forms, sculpture and anatomy of the groups treated on. A copious index is appended to the volume, which embraces not only a full synonymy of all the species mentioned in the volume, but a detailed and lucid explanation of the plates with which it is enriched.

The work, as far as it has been issued, promises to be of a very complete character, and will materially facilitate the labors of Conchologists in determining any doubtful specimens they may have occasion to examine.

Those Conchologists desiring copies of this work should not delay notifying their desire, as the edition is strictly limited to 250 copies, and the work will in a few years augment greatly in value.

English subscriptions may be sent to Trübner & Co., Ludgate Hill, London, and we trust that our English brethren will not fail to encourage this much desired and valuable work.



LIST OF MOLLUSCA OBTAINED IN SOUTH CAROLINA AND FLORIDA (PRINCIPALLY AT THE ISLAND OF KEY WEST IN 1871-1872.

By JAMES COSMO MELVILL, M.A., F.L.S.

Class : CEPHALOPODA.

1. *Octopus* (sp.)

About three feet in diameter, body fawn colored, with white spots. Key West, among loose blocks of coral.

2. *Spirula lævis* (Gray).

Abundantly cast ashore at Key West, but often in fragmentary condition.

Class: HETEROPODA.

3. *Ianthina communis* (Lam.)

Abundantly cast ashore at Key West after gales. In one or two instances I have found the animal alive, with its well-known "raft." The Portuguese Man of War (*Physalia*) and the *Velella* invariably seem to accompany the *Ianthina*.

4. *I. exigua* (Lam.) With the preceding.

[A third and perhaps a fourth species I likewise found at Key West, but so similar are all the species of that section that I forbear naming it provisionally.]

Class: GASTEROPODA.

Fam: MURICIDÆ.

5. *Murex Salleanus* (H. Adams).

Coral reef, Key West, but rare.

6. *M. (Ocinebra) tetragonus* (Brod.)

Key West. Common.

7. *M. (Ocinebra) cyclostomus* (Sowb.)

Key West. Common.

8. *M. (Muricidea) hexagonus* (Lamk.)

Not common. I found three or four specimens, mostly tenanted by Hermit crabs. In good condition, the mouth of this species is often found of a pink color.

9. *Trophon cinereus* (Say.)

Abundant on rocks at low water, Sullivan's Island and Fort Sumter, South Carolina.

10. *Cantharus coromandelianus* (Lamk.)

Very abundant. Coral reefs. Key West.

11. *Hemifusus corona* (Gmel.)

The normal form. Cedar Keys. West Florida.

11. **Hemifusus corona β estephomenos** (Melv.)

This marked variety may probably be constituted a new species. It differs from the type in being uniformly smaller, and in the almost complete absence of one of the two rows of spines on the last whorl.

It was found in one place only at Key West, but there in great abundance on very shallow coral slabs, covered with about two feet of water, and surrounded by a brackish Mangrove swamp.

(It has been figured by Sowerby in Zool. Pro., Nov., 1878. Plate xlviii, f. 13.)

12. **Ranella (Eupleura) caudata** (Say.)

Rare. Sullivan's Island. South Carolina.

Fam : BUCCINIDÆ.

13. **Nassa antillarum** (Phil.)

Key West. Common.

14. **N. ambigua** (Mt.)

Key West. -Common.

15. **N. vibex** (Say.)

Charleston Harbour. South Carolina.

16. **N. trivittata** (Say.)

Charleston Harbour. South Carolina.

17. **N. obsoleta** (Say.)

Charleston Harbour. In countless myriads on the muddy estuary of the Ashley River, Charleston.

Fam : PURPURIDÆ.

18. **Purpura deltoidea** (Lamk.)

Profusely abundant on the southern shore of Key West. May always be known by the delicate violet coloring of the mouth, when in fresh state.

19. *Purpura bicostalis* (Lamk.)

20. *P. fasciata* (Reeve.)

21. *P. floridana* (Conrad.)

All more or less common on the reefs, Key West.

22. *P. biserialis* (Blvle.)

One shell referred by Mr. G. B. Sowerby, jun., to this species may be but a variety of one of the preceding. There seems to be as much variety among the *Purpuræ* of the sub-genus *Stramonita* as among the *Nassæ*, which have been so ably taken in hand by Mr. F. P. Marrat.

23. *Ricinuia nodulosa* (C. B. Adams.)

On the reefs, Key West.

Fam: *OLIVIDÆ*.

24. *Oliva reticularis* (Lam.)

Not uncommon at Key West, but, as far as I have seen specimens, all of one variety, with pale pink markings.

25. *O. litterata* (Lam.)

Charleston Harbour. This may prove to be but a northern variety of *O. reticularis* (Lamk.)

26. *O. mutica* (Say.)

South Carolina—especially on the breakwater by Sullivan's Island (now, I believe, removed). I also came across the species on the Florida coast.

27. *O. nana* (Lam.)

Key West.

28. *O. exigua* (Mart.)

Key West.

29. *O. nivea* (Gm.) = *eburnea* (Lam.)

Key West.

*Fam. : FASCIOLARIDÆ.*30. *Fasciolaria distans* (Lam.)

Charleston Harbour. Not uncommon.

31. *F. tulipa* (L.)

Key West and Cedar Keys, West Florida.

32. *F. scheepmakeri* (Dunker.)

I was fortunate in finding two specimens of this rare mollusc, both fine, though in dead condition, on the southern shores of Key West. It appears to differ from *F. tulipa* (L.), its nearest congener, by the more massive build, and by being uniformly ribbed throughout.

33. *Busycon aruanum* (L.)

Very common and fine on Sullivan's Island, South Carolina—frequently attaining a large size.

34. *B. perversum* (L.)

This is probably a sinistral var. of *B. aruanum*. I found them associated together in Carolina, but on the West coast of Florida and at Key West I found only the *perversum*.

35. *B. canaliculatum* (L.)

Charleston Harbour. Not common.

36. *B. spiratum* (Lam.)

Key West. One specimen.

37. *Leucozonia knorrrii* (Desh.)

On the coral reefs, Key West. The animal is of the color of raw beef.

38. *Latirus Cayohuesonicus* (Sowb. and Melvill, 1878.)

This interesting little species was recently described by Mr. Sowerby in the Zool. Proceedings (Nov. 5, 1878). It is in form almost an exact miniature representative of the

L. infundibulum (Gmel.), but is of a black-brown color throughout. I did not find many specimens, and those mostly in bad condition.

Fam : VOLUTIDÆ.

39. *Marginella diaphana* (Kien.)

Common. Key West.

40. *M. conoidalis* (Kien.)

Common. Key West.

- 40A. *M. longivaricosa* (Reeve) = *guttata* (Auct.)

Key West.

41. *Volvaria lactea* (Kien.)

Common. Key West.

Fam : COLUMBELLIDÆ.

42. *Columbella mercatoria* (Lamk.)

Very abundant at Key West, in many varieties.

43. *C. spongiarum* (Duclos.)

One specimen, Key West, on Gorgonia.

44. *C. (Anachis) avara* (Say.)

In countless myriads on the breakwater, Sullivan's Island, Charleston Harbour.

45. *C. (Anachis) ostreicola* (Melvill MS. n. sp.)

This species, which is still undescribed, is allied to *C. nigricans*, but is smaller and very distinct. Found on oyster shells (*O. rostrata*) at Appalachicola, Gulf of Mexico.

Fam : CASSIDIDÆ.

46. *Oniscia oniscus* (L.)

On the shore, Key West.

Fam : DOLIIDÆ.

47. *Dolium perdix* (L.)

Key West, but not common.

Fam: *NATICIDÆ*.48. *Natica campechiensis* (Recluz.)

I take the South Carolina mollusc, usually called *duplicata* (Say), to belong to this species, but all the *Neveritæ* of Risso are similar, and probably most of them wide spread varieties of one species. *N. duplicata* (Say) is probably a variety of *N. heros* (Say), which I noted as very common in Nahant Harbour, Massachusetts, but I found nothing approaching it in South Carolina.

49. *N.* sp. Not in good condition. Allied to the *albula* section. Key West.50. *Sigaretus perspectivus* (Say).

Sullivan's Island, South Carolina.

Fam: *SCALARIDÆ*.51. *Scalaria angulata* (Say.)

Sullivan's Island, Charleston Harbour.

52. *S. venosa* (Sowb.)

Key West.

Fam: *TEREBRIDÆ*.53. *Terebra dislocata* (Say.)

Charleston Harbour.

Fam: *PYRAMIDELLIDÆ*.54. *Obeliscus terebellum* (Müll.)

In fragmentary condition. Key West.

55. *Chemnitzia Indianola* (Sowb.)

Appalachicola, Florida, Gulf of Mexico.

Fam: *CONIDÆ*.56. *Conus leoninus* (Hwass.)

Key West. Perhaps a variety of *spurius* (Gm.)

57. *C. L'Argilliertii* (Kien.) = *Japonicus* (Hwass.)

Key West. Not uncommon, but not in good condition.

58. **Conus columba** (Brug.)

Very abundant on the reefs, Key West.

59. **C. pusio** (Lam.)

Abundant. Key West.

60. **C. Pealii** (Green.)

One specimen found—may be this species—but it is in very bad condition.

61. **C. Melvillii** (Sowb. jun., 1879.)

One specimen. Key West. This very distinct species is represented by Mr. Sowerby as being probably near *C. reticulatus*. To my mind it approaches *C. adansoni* (Lam.) an African species, but it is abundantly distinct from any species known.

62. **C. nebulosus** (Soland.)

One specimen in young state, with very sharp spire. I did not observe *C. Floridensis* (Sowb.)

Fam : *STROMBIDÆ*.

63. **S. bubonius** (Lam.)

Key West.

64. **S. lobatus** (Sw.) = **bituberculatus** (Lam.)

Key West.

65. **S. gigas** (L.)

Very abundant on the reefs, Key West, but mostly in young state. Upon incautiously handling a specimen I was bitten in the hand, though, happily, not very severely.

Fam : *CYPREIDÆ*.

66. **Cypræa exanthema** (L.)

On the mangrove stems, North shore, Key West. Very fine specimens.

67. **Ovula (Birostra) acicularis** (Lam.)

On Gorgoniæ, Sullivan's Island, Charleston Harbour.

68. **O. (Birostra) uniplicata** (Sowb.)

With the preceding, but rarer. It is significant that the specimens of the species affecting the yellow *Gorgonia* are of that colour, while those that cling to the purple species are purple.

Fam : CANCELLARIDÆ.

69. **Cancellaria reticulata** (L.)

Key West. Four fine specimens.

Fam : CERITHIDÆ.

70. **Cerithium litteratum** (Born.)

Key West. Very abundant.

71. **C. mutabile** (C. B. Ad.)

One or two specimens. Key West.

72. **C. uncinatum** (Gmel.) ?

Key West. I am not quite sure about this name, but it is the nearest approach to the specimens I found.

73. **C. (Lampania) septem-striatum** (Say.)

On the reefs at Key West—at all events on the southern side. This species abounds in countless thousands. One sweep of the hand on the rocks, or in the rock pools at low water, will suffice to obtain hundreds of specimens of all sizes and varieties.

74. **Bittium sp : ?**

One specimen from Sullivan's Island, South Carolina.

75. **Cerithidea crassilabrum** (Ad.)

Cedar Keys, West Florida.

76. **C. costata** (Wood.)

With the preceding.

Fam : LITTORINIDÆ.

77. **Littorina Sayi** (Phil.)

Cedar Keys, West Florida—quite away from the sea,

but there are numerous saline marshes and oyster beds in the vicinity.

78. *L. angulifera* (Lam.)

Key West.

79. *L. ziczac* (Chem.)

- Key West and Havana, Cuba.

80. *L. carinata* (D'Orb.)

Key West and Havana, Cuba.

81. *Tectarius dilatatus* (D'Orb.)

Key West and Havana, Cuba, on rocks at low water.

82. *T. muricatus* (L.)

Next to *Cerithium 7 striatum*, the most abundant gasteropod at Key West.

83. *T. nodosus* (Gray.)

Common.

84. *T. breviculus* (Phil.)

Common.

85. *Modulus lenticularis* (Chem.)

Common at Key West.

Fam : PLANAXIDÆ.

86. *Planaxis lineata* (Da Costa.)

Key West.

87. *P. sp.*

With the preceding. It may be only a variety.

Fam : VERMETIDÆ.

88. *Vermetus cochlidium* (Cpr.)

On *Aviculæ*. Key West.

89. *V. contortus* (Cpr.)

On *Avicula Peruviana*. Key West.

90. *V. sp.*

On *Aviculæ*. Key West.

Fam : CALYPTRÆIDÆ.

91. **Crepidula fornicata** (L.)
 South Carolina. Generally common.
92. **C. plana** (Ad. & Rve.) = **unguiformis** (Auct.)
 Key West and Charleston Harbour.
93. **C. aculeata** (Gm.) and var. **hystrix**.
 South Carolina and Key West. Common. The *Crepidulæ* are so very variable that there may have been some species passed over. They are very partial to *Fasciolaridæ*. I found one specimen of *Fasciolaria distans* in Charleston Harbour, with perhaps 30 to 40 *C. plana* adhering, of all sizes and shapes.

Fam : CAPULIDÆ.

94. **Hipponyx radiata** (Q. & G.)
 Common on dead shells. Key West.

Fam : NERITIDÆ.

95. **Nerita peloronta** (L.)
 I did not find the "Bleeding Tooth" very common at Key West.
96. **N. tessellata** (Gm.)
 Abundant at Key West.
97. **N. versicolor** (Lam.)
 Abundant on the reefs, and very variable.

Fam : TROCHIDÆ.

98. **Uvanilla latispina** (Phil.)
 Key West.
99. **Astralium costulare** (Lam.)
 Key West.
100. **Pachypoma americanum** (Gm.)
 Key West.
101. **Omphalius carnestus** (Lam.)

Fam: FISSURELLIDÆ.

102. *Fissurella Barbadensis* (Gm.)

Key West.

103. *F. græca* (L.)

Key West.

Fam: BULLIDÆ.

104. *Bulla striata* (Brug.)

Key West. Dead specimens only.

Fam: HELICEA.

105. *Glandina truncata* (Gm.)

Key West, but not very large.

106. *Helix carpenteriana* (Dkr.)

Key West, South Florida.

107. *H. septemvolva* (Say.)

Key West, South Florida.

108. *H. monodon* (Rack.)

Key West, South Florida.

109. *H. cereolus* (Muhlfd.)

Key West, South Florida.

I need not recapitulate here the ordinary forms of *Helix* (s. g. *Anchistoma*) found generally in Carolina, Georgia and Florida, e.g., *H. palliata* (Say), *fallax* (Say), *auriculata* (Say), &c.

110. *Liguus (Achatina)* sp., semifossil.

Allied to *virginea* (L.), in the recent coral, white. Key West, always bleached. It may prove to be a new subfossil species.

111. *Bulimus Menkeanus* (Grüner) = *venosus* (Sowb.)

Under Cacti, Key West.

112. *Cylindrella variegata* (Pfr.)

Key West, South Florida, under Cacti.

113. *Stenogyra decollata* (L.)

Charleston, South Carolina, in gardens, presumably imported from Europe.

114. *Pupa (Strophia) maritima* (Pfr.)

Key West.

115. *Succinea ovalis* (Say).

Neighbourhood of Charleston, South Carolina.

Fam: AURICULACEA.

116. *Melampus spiralis* (Pfr.)

On heather and shrubs (*Andromedæ* and *Vacciniæ*), Cedar Keys, West Florida, near the salt marshes.

Fam: LIMNÆIDÆ.

Several species of *Physæ* and *Planorbes*, including *P. heterostropha* (Say), *P. ancillaria* (Say) and other well known American forms, and *Planorbis corpuſentus* (Say).

Fam: SIPHONARIDÆ.

117. *Siphonaria subrugosa* (Sowb.)

Very common on the reefs at Key West.

Fam: ACICULACEA.

118. *Truncatella bilabiata* (Pfr.)

Under Stones, Key West, abundant.

Fam: CYCLOSTOMIDÆ.

119. *Chondropoma* sp:—

Key West:

Fam: HELICINIDÆ.

119. *Helicina orbiculata* (Say).

Key West.

CONCHIFERA.

Fam: PHOLADIDÆ.

122. *Pholas costata* (L.)

Charleston Harbour, South Carolina.

Fam: SOLENIDÆ.

123. **Tagelus (Solecurtus) Caribæus** (Lam.)

Charleston Harbour, common.

Fam: GLYCIMERIDÆ.

124. **Saxicava distorta** (Say).

Sullivan's Island, Charleston.

Fam. MACTRIDÆ.

125. **Hemimactra similis**, (Say.)

Charleston.

121. **Raeta canaliculata**, (Say.)

Charleston Harbour and Sullivan's Island, S. C.

I met with the large *Maetra solidissima*, (Chem.) and various other *Maetracæ* on the shores of New England, etc. but with no others than the two above-mentioned in the Southern States. No doubt *Maetra Sayi* (Gray) and others would have rewarded more prolonged research.

Fam. TELLINIDÆ.

126. **Asaphis dichotoma**, (Anthony)

Key West, South Florida.

127. **Tellina alternata**, (Say).

South Florida.

128. **T. fausta**, (Donovan).

Very fine at Key West South Florida.

129. **T. lineata**, (Turton).

Key West, South Florida.

130. **T. robusta**, (Hanley).

The specimens found of this, from Key West, were pronounced by Mr. Sowerby, who examined them, larger than was ordinary.

131. **T. radiata**, (L.)
Key West, common. The var. *unimaculata*, (Lamarck)
also observed.
132. **T. similis**, (Sowerby).
Key West, South Florida.
133. **T. tenera**, (Say).
Key West, South Florida.
134. **T. interrupta**, (Wood).
Very fine at Key West, though not abundant.
135. **T. sol**, (Hanley).
This magnificent species, belonging to the subgenus
Phylloda is the finest bivalve I obtained. It was very rare
at Key West, and I only succeeded in finding two specimens.
136. **Strigilla carnaria**, (L.)
Key West, South Florida.
137. **S. pisiformis** (L.)
Key West, South Florida.
- Fam: AMPHIDESMIDÆ.*
138. **Amphidesma orbiculatum** (Say).
Charleston, South Florida.
- Fam: DONACIDÆ.*
139. **Donax variabilis** (Say).
South Carolina and South Florida.
- Fam: VENERIDÆ.*
140. **Callista (Dione) gigantea** (Chem.)
Magnificent specimens of all sizes, Key West.
141. **Mercenaria Mortonii** (Conr.)
South Florida.
142. **M. violacea** (Schum.)=**Venus mercenaria** (L.)
South Carolina.

143. **Gemma Totteni** (Desh.)
Coast of South Carolina.
144. **Anomalocardia impressa** (Anthony).
Key West, South Florida.
145. **Chione cancellata** (L.)
Key West, South Florida.
146. **Artemis (Dosinia) discus** (Reeve).
Sullivan's Island, South Carolina.
147. **Petricola pholadiformis**, (Lam.)
Sullivan's Island, South Carolina.
Fam. CYRENIDÆ.
148. **Cyrena carolinensis**, (Bosk.)
Ashley River, South Carolina.
Fam. CARDIADÆ.
149. **Cardium magnum**, (Born).
Very common on the sandy coast of South Carolina.
150. **C. muricatum**, (L.)
Key West, South Florida.
151. **Lævicardium lævigatum**, (L.)
Key West, South Carolina.
152. **L. serratum**, (L.)
Key West, South Carolina.
153. **Hemicardium medium**, (L.)
Key West, South Carolina.
Fam. CHAMIDÆ.
154. **Chama macrophylla**, (Ch.)
Mostly attached to large Gorgoniæ, Key West.
Fam. LUCINIDÆ.
155. **Lucina Jamaicensis**, (Lam.)
Key West, but rare.
156. **L. Pennsylvāica**, (Lam.)
In countless thousands, Key West. Surely the name

is a misnomer. This species does not range so far north as Pennsylvania.

157. **L. tigerina**, (L.)

Very abundant, Key West.

158. **Loripes chrysostoma**, (Meusch).

Key West, South Florida.

159. **L. edentula**, (L.)

With the preceding. Probably both are forms of one species.

Fam. CRASSATELLIDÆ.

160. **Cardita (Mytilicardia) Floridana**, (Sowb.)

Key West, South Florida.

Fam. MYTILIDÆ.

161. **Crenella glandula**, (Totten).

South Carolina.

162. **Modiola plicatula**, (Lam.)

Very abundant in Charlestown Harbour; also at Key West.

163. **Mytilus cubitus**, (Say).

Key West, South Florida.

164. **Lithodomus candigerus**, (Lam.)

Key West, South Florida.

[and another species: probably *stramineus*, (Dunker).]

Fam. AVICULIDÆ.

165. **Avicula ala-perdici**, (Reeve).

166. **A. Peruviana**, (Reeve).

Both species very abundant on Gorgoniæ.

167. **Pinna muricata**, (L.)

Charleston Harbour, (fragmentary).

Fam. ARCIDÆ.

168. *Arca Noæ*, (L.)
Key West; I assume this to be the same form as the
Mediterranean species.
169. *Barbatia* sp:—
Key West, not in good condition.
170. *Scapharca incongrua*, (Say).
Charleston Harbour.
171. *S. inæquivalvis*, (Brug.) or allied species.
Key West, South Florida.
172. *S. occidentalis*, (Phil.)
Southern shores of Key West.
173. *Pectunculus pectiniformis*, (Lamk.)
Key West, South Florida.
174. *Argina pexata*, (Say).
South Carolina.
175. *A. Americana*, (Gray).
Charleston Harbour, more abundant than the last.

Fam. PECTINIDÆ.

176. *Pecten circularis*, (Sowb.)
Cedar Keys.
177. *Lima scabra*, (Born).
Key West.
178. *Spondylus ramosus*, (Reeve).
Key West, common.

Fam. OSTREIDÆ.

179. *Ostrea frons*, (L.)
On Mangrove stems, etc., Key West.
180. *O. rhizophoræ*, (Gray).
On Mangrove stems, etc., Key West.

[It will be observed that I have made no mention of the *Melaniadæ* and *Unionidæ*. At Key West I did not come across a single specimen of these families, which is not surprising in the inland torrents, but are fond of fresh water. I found several species in my North American travels, but very few in South Carolina, and those of no particular peculiarity of form].

My thanks are due to Mr. G. B. Sowerby, junr., for having materially assisted me in the discrimination of the more critical species. It will be observed that the mollusca belong to two distinct provinces:—(i).—The Carolinean section of the Transatlantic and (ii)—The Caribbean—The fauna and flora of Key West are almost wholly tropical, presenting a curious change from the mainland of Florida, separated only by a channel of the Gulf stream, some fifty miles or so in width. The Florida Keys, of which this is the principal in size, are entirely of the coral formation, often only a few inches above high water mark.



UNIO LUTEOLUS, (LAMARCK). & ITS ALLIED FORMS.

By PROF. F. M. WITTER.

(Read before the Conchological Society).

Common in slough below Keokuk Lake, Muscatine County. Found in greater or less abundance in the Mississippi at Muscatine; in creek near Brown's Ferry on Cedar river in Muscatine Co.; in Mud creek at Wilton; in Des Moines river at Des Moines; and Skunk river at Ames, in fact it is found almost everywhere in the Mississippi valley, especially in the northern half and in the valley of the St. Lawrence.

Considerable confusion exists concerning this species, It seems to me that we have three forms near *Muscatine* known as *luteolus*; of these three forms I should make two groups; in the first group there might be placed those forms with numerous delicate undulations or folds about the beaks, and the shells are usually a little less than twice as long as wide, there is a large percentage of green in the color of the epidermis and some examples are very beautiful; this group seems with us to prefer small and rather sluggish creeks or sloughs with muddy bottoms. I shall designate the first group as (*A*), and the second as (*B*). (*A*), is capable of subdivision and these forms may be represented by (*a*), and (*β*). (*a*), is much smaller and lighter in every way than (*β*), umbones very low, and generally less brilliantly colored. I have not found the two forms (*a*) and (*β*) in the same waters. The largest of the form (*a*), measures as follows: length 7.8, breadth 4.4, diameter 2.2 cm.

(*β*), has rather prominent umbones, is darker in color and a larger and heavier shell, the undulations about the beaks in these two forms appears to be the same. (*β*) measures as follows, length 11.3, breadth 6, diameter 4.5 cm. There seems to be but little difference in the size of mature shells, except the diameter. In this respect there is a very marked exception in both forms. A thin form, especially flattened and somewhat pointed posteriorly, and a tumid form, truncated posteriorly. These I have regarded as fertile and sterile respectively. Group (*B*), contains forms in most respects very different from those mentioned above. The epidermis is often yellow, with scarcely a line of green to be seen, and is highly polished. The umbones are high, in some as well developed as in *occidens*, Lea. At the beaks are two or three coarse folds or wrinkles. The hinge teeth appear to be the same as those of *occidens*. In this group there is a form somewhat pointed posteriorly and another with a most conspicuously truncated posterior and very wide behind the umbones. A large example of group

(*B*), from the Cedar river, in Muscatine County, weighs 14 oz., length 14.8, width, 10.7, diameter 7.8 cm.

It seems to me the *luteolus*, of Lamarck, is most likely, (α), in group (*A*). It is a small light shell compared with the others. (β), of group (*A*) is known by some as *siliquoidens* of Barnes, but Lea does not recognize this as a good species. The two forms are not found in the same waters here, each occurring in several localities in eastern and central Iowa, but in each case, so far as I have seen the form is more or less closely maintained. If *siliquoidens* cannot be retained as a species, it certainly is, in this region, a conspicuous variety. As to group (*B*), it is quite certain some considerable misapprehension exists among conchologists. It has been described under the name of *ventricosus*, by Barnes, and figured as such in Say's Conchology. The form is abundant in our interior streams, but not associated with group (*A*), so far as I have seen. Some examples of group (*B*) vary towards (α), in group (*A*), and others are so close to *occidens*, as to make it difficult for me to separate them. Is it not probable that these three forms are due to altered conditions under which they live? Most of my correspondents send me form (*B*), labelled *luteolus*. It would appear that *luteolus* varies in one direction towards *ligamentinus*, Lamarck, of some of our streams, towards *radiatus*, Lamk., &c., and in another towards *canadensis*, Lea, *ventricosus*, Barnes, and *cariosus*, Say. There is a large group that seems to centre about *luteolus*.



Note on *Helix rosacea*, (PETTERD).—Mr. W. F. Petterd has described a *Helix* from Tasmania under the name of *rosacea*, (J.C. vol. ii, p. 213) but that name is pre-occupied by Müller, for a South African species, now usually but not universally considered a variety of *H. globulus*.—J. S. GIBBONS, M.B., Southampton.

PROPOSED INTERNATIONAL CONCHOLOGICAL CONGRESS AT VENICE.

We are desired by the Council of the Italian Malacological Society, to draw attention to the appended invitation to conchologists to take part in an international assembly of those persons interested in the science. As appears from the announcement the meeting will take place in September next at Venice. We trust our country will be worthily represented on the occasion.

SOCIETA MALACOLOGICA ITALIANA

PISA, 8, Fevrier, 1881.

Très honoré confrère,

Se conformant à la délibération prise dans une séance générale de l'année passée, le conseil directif de la société Malacologique Italienne a décidé de convoquer les membres de cette société, ainsi qu'il les étrangers à la société qui s'occupent de cette branche de l'histoire naturelle, à intervenir à une séance extraordinaire qui sera tenue à Venise au mois de Septembre prochain.

Dans cette réunion on s'occupera particulièrement des questions qui se rapportent à la conchyliologie en général et en particulier.

On a choisi la ville de Venise à cause de la coïncidence dans le même mois du congrès international de Géographie et de celui de Géologie qui doit être tenu à Bologne.

Le conseil directif se réservant de vous informer, pas plus tard du mois de Juillet prochain, de l'ordre de la discussion du jour de la séance et de l'adresse de la salle où la société devra se réunir, compte dès à présent que vous voudrez honorer de votre présence cette réunion.

Agréez, très-honoré confrère, l'assurance de notre considération distinguée.

J. MENEGHINI, Président.

M. PAULUCCI, Vice-Président.

R. LAWLEY, Trésorier.

D. PANTANELLI, }
B. CAIFASSI, } Secrétaires.

P.S. Vous êtes prié, Monsieur, de faire parvenir un mot de réponse à la direction.

Hyalina Draparnaldi, (BECK,) in England.—This shell puzzled me for a long time, I received at first from some friends specimens from Guernsey; later on some from Miss F. M. Hele, of Bristol. I also collected specimens myself near Bristol in 1877, and the same autumn found one specimen at Torquay, in Devon. As I had no specimens of *Hyalina Draparnaldi* to compare them with, I was content all this time to leave them in my collection as *Zonites cellarius* var. *major*, but a short time since I sent some to my good friend Dr. Boettger, who immediately pronounced them to be *Draparnaldi*, so this gives a new shell to our country, and from three different localities.—(Mrs.) J. FITZGERALD, Folkestone.

Succinea Pfeifferi, (Rossm.) at Folkestone.—I find this species here tolerably abundantly, Dr. Boettger says it is the true shell beyond all doubt. (Mrs.) J. FITZGERALD, Folkestone.

Note on the association of species.—With regard to Mr. Nelson's article "On association of species" I have found *Limnæa glabra* in a small but deep pond in a field near Leckonfield Moat, the vegetation was mainly *Ranunculus*, but there was a quantity of other vegetation, the only other shell I found associated with it was *Planorbis spiroorbis* and a few *Limnæa peregra*.

In a ditch at Figham (one of the Beverley free pastures), where the water is strongly impregnated with iron, I found *Planorbis corneus*, *P. contortus*, *P. complanatus*, *P. carinatus*, *P. vortex*, *Bythinia tentaculata*, *B. Leachii*, *Limnæa peregra*, *Physa fontinalis*, *Valvata piscinalis*, *Sphærium corneum*. and a *Pisidium* I have not yet determined.

Unfortunately for conchologists they are fond of clean ditch bottoms here, and I fear this one will suffer before long.—J. D. BUTTERELL, Beverley.

Cyclostoma elegans (MULL.) in the Lake district.—I have just received through the kindness of a friend, some specimens of this species which he has recently found at Silverdale. It is I believe a somewhat more northerly habitat than yet recorded for this species.—R. SCHARFF, Edinburgh University.

Note on Yorkshire Shells.—Some of the following additional localities for Yorkshire shells acquired by me personally during the past year may interest the readers of this journal.

Sphærium lacustre. In profusion in ponds near Rawcliffe, York.

Pisidium pusillum var. **cinereum.** Fine in a pond near Falsgrave, Scarbro'.

Unio pictorum var. **curvirostris?** Ouse, below York.

Planorbis albus. Scarbro' Castle Hill, Clifton Ings and Hobmoor ponds.

P. corneus. Seamer Mere.

Limnæa stagnalis. Very fine in Seamer Mere.

Helix nemoralis var. **hybrida.** Fulford.

H. nemoralis var. **scalariformis.** Carnaby.

H. hispida var. **albida.** Scarbro'.

H. caperata. Thirsk. Var. **ornata.** Scarbro'.

H. ericetorum. Scarborough.

H. lapicida. Kilnsea Crag and Kettlewell.

Succinea elegans. Flambro' Head and Scarbro' cliffs.

Zonites nitidus. Clifton Ings, in plenty.

Pupa secale. Kettlewell Crag.

Clausilia rugosa. Scarbro', in profusion.

C. rugosa var. **dubia.** Kettlewell Crag.

Rev. W. C. HEY, M.A., The Residence, York.

BIBLIOGRAPHY.

Die Mollusken der Maskerenen und Seychellen
(The Mollusca of the Mauritius and Seychelles).—Von Prof. E.
v. Martens.

This large and elaborate work which is illustrated by 4 colored plates, is prefaced by a lengthy list of the authors who have written on any of those interesting and productive islands, with the titles of their works. The geographical distribution of each species is well indicated by a series of signs of which a full explanation is furnished at the commencement of the volume.

One hundred and sixty-three species of land shells which are ranged in two great groups termed *Pneumopoma* and *Stylemmatophora*. *Pneumopoma* embraces the sections *Cyclostomacea* and *Helicinidæ*, and 41 species are catalogued.

One species of Cyclostomacea, *Omphalotropis Moebii* (pl. xix., f. 1) is described as new.

The group *Stylemmatophora* is subdivided into *Oxygnatha*, with 31 species. *Aulacognatha* with 39, of which one, *Cæciliannella* (*Geostilbia*) is noted as new. *Agnatha* has 43 species, *Elasmognatha* has but six, and *Vaginulidæ* three.

Of brackish water species, four are *Truncatellidæ*, and nineteen *Auriculidæ*.

In the freshwater shells, five are *Limnæidæ*, ten *Paludinidæ*, and eight are *Neritidæ*, one of which, *Neritina* (*Neritilia*) *consimilis*, is described as new.

The marine shells are noted from Madagascar in addition to the localities cited in the preceding groups. Twelve hundred and thirty-two species are catalogued, distributed as follows:—Cephalopods and Pteropods 12, Gastropods 985, Bivalves 232;

and 2 Brachiopods. Of this number the following are described as new:—*Clathruella rufinodis*, Mauritius (pl. xx., f. 2), *Daphnella trivariosa*, Mauritius (pl. xx., f. 1), *Terebra cærulescens* v. *flammulata* (pl. xx., f. 5), *Pisania nævosa*, Mauritius (pl. xx., f. 8), *Pisania amphodon*, Mauritius (pl. xx., f. 9), *Phos textus* v. *rhodostoma*, Seychelles (pl. xx., f. 7), *Plicatella* (*Peristernia*) *bonasia*, Seychelles (pl. xx., f. 6), *Columbella spiratella*, Mauritius (pl. xx., f. 12), *C. circinnata* (pl. xx., f. 14), *Turricula* (*Thala*) *simulans*, Mauritius (pl. xx., f. 18), *Marginella majuscula*, Cargados (pl. xxii., f. 2), *Triforis crassula*, Mauritius (pl. xxii., f. 1), *Turritella concava*, Mauritius (pl. xx., f. 19), *Rissoa* (*Alvania*) *Mauritiana*, Mauritius (pl. xx., f. 17), *Leptothyra purpurata* v. *tringulata*, Mauritius, *Leptothyra roseocincta*, Mauritius (pl. xx., f. 22), *Trochus* (*Aphanotrochus*) *chrysolemus*, Mauritius (pl. xx., f. 20), *Chemnitzia chrysozona*, Mauritius (pl. xx., f. 21), *Doridium guttatum*, Mauritius, *Aplysia nigrocincta*, Mauritius (pl. xxi., f. 3), *Pleurobranchus scutatus*, Mauritius (pl. xxi., f. 8), *Gadinia Mauritiana*, Mauritius (pl. xxii., f. 3), *Pinna æquilatera*, Mauritius (pl. xxii., f. 4), and *Lucina* (*Divaricella*) *angulifera* (pl. xxii., f. 14).

This excellent treatise closes with a tabular view of the relative distribution of the species in the different places enumerated, and an account of the anatomy of *Buliminus velutinus*, *Pachystyla inversicolor* and *Stylodonta unidentata*.

Deep Dredgings in the Lake of Tiberias.—In the deep dredgings in the Lake of Tiberias, M. Lortet has found ten species of mollusca, three of which are new to science, *Unio Lorteti*, *U. maris-galilei* and *U. Pietri*. The other species are *Unio terminalis*, and *U. tigrinus*, *Cyrena fluminalis*, *Neritina jordani*, *Melania tuberculata*, *Melanopsis præmorsa*, and *M. costata*. The three latter give the fauna a marine aspect, The *Unio* shells at

the depth of 250 metres were curiously softened and resembled in condition the fossils of some of the tertiary strata of the middle of France; this is considered to be chiefly due to pressure.

Description of a new species or variety of Land shell from California,—*Helix v. circumcarinata*.—By R. E. C. Stearns.—From the Annals of the N. Y. Acad. of Sciences, Vol. 1, No. 10, Nov., 1879.

A full description and figures, of a *Helix* found in Stanislaus county, California, by Mr. Crawford of Oakland, and regarded by the author, as a variety of *Helix mormonum*, under the name of var. *circumcarinata*. It would however be regarded by many authors as a distinct species.

Tenacity of life in freshwater mollusca.—By John L. Hawkins.—Science Gossip, Jan. 1881, p. 23.

Some *Limnæa stagnalis* which were kept in an earthenware jar, in a cold greenhouse, being neglected, the water evaporated, leaving the shells dry. After they were discovered in this state, they were left for about two months, when the jar was refilled with water, and a number of the specimens shortly afterwards revived. Mr. Hawkins remarks that the specimens which survived the ordeal were the smallest and least developed.

The deep sea Mollusca of the Bay of Biscay.—By J. G. Jeffreys, LL.D., F.R.S.—From the Annals and Magazine of Natural History, Oct., 1880.

Dr. Jeffreys by invitation of the French Minister of Public Instruction, took part in the deep sea exploration in the Bay of Biscay during July, 1879, in the 'Travailleur'.

In that cruise 152 species were collected, five of which were Brachiopods. Sixty-five were Conchifera of which *Pecten obliquatus*, Jeffr. MS., *Lima Jeffreysi*, Fischer, MS., *Mytilus luteus*, Jeffr.,

MS., *Modiolaria cuneata*, Jeffr., MS., *Axinus tortuosus*, Jeffreys, MS., *Mytilimeria? Fischeri*, Jeffr., MS., *Lyonsia formosa*, Jeffreys, MS., *Verticordia insculpta*, Jeffr., MS., *Neæra bicarinata*, Jeffr., MS., *N. sulcifera*, Jeffr., MS., *N. truncata*, Jeffr., MS., and *N. imbricata*, Jeffr., MS., were new to science or have not previously been described.

Eight species of *Solenaconchia* were found one of which *Cadulus semistriatus*, Jeffr., MS., is new to science and *C. artatus*, Jeffr., MS., which though previously known has not yet been published.

Of the sixty-five species of Gastropods, *Rimula asturiana*, Jeff., MS., *Odostomia lineata*, Jeffr., MS., and *Bullina elongata*, Jeffr., MS., are new.

Six species of Pteropods were found, none of which were new.

Three species *Chiton alveolus* Sars, *Fusus turgidulus* Jeff., M.S., and *Pleurotoma nivalis* Lov., are distinguished by Dr. Jeffreys as peculiarly Northern species, while he indicates *Odostomia fasciata* Forbes, as peculiarly Southern or Mediterranean.

In summing up the results, the author shows that of the species found 11 are new, 3 Northern, 1 Southern, and 137 had previously been found in the cruise of the "Porcupine." M. de Folin is engaged in examining the sifted material, and when his labors are completed it is probable other species will require to be added to the list.

Notes on the Land Shells of Dominica.—By A. D. Brown.—*American Naturalist*, Jan., 1881, p. 56.

Mr. Guppy in the *Annals and Magazine of Natural History*, for 1868, has some remarks on the shells of Dominica, which Mr. Brown's experience tends to show are extremely erroneous. Mr. Guppy, says, "on the lower slopes near the sea, I found a few mollusca chiefly *Bulinus exilis*, *Stenogyra octona*, *Succinea approximans*, and *Helicina humilis*. Ascending higher we find *Helix*

dentiens, *H. badia*, *H. Josephinae*, *H. nigrescens*, *Amphibulina patula*, *Bulimus laticinctus*, and *Helicina epistilia*, excepting the last all these species are found everywhere above 300 or 400 feet of elevation."

An analysis of Mr. Brown's observations show that *Stenogyra octona* and *Helicina antillarum*, Sow., are common everywhere, *Helix badia* and *H. dentiens* are most plentiful below 800 feet and *Bulimus exiles* below 1000 *Succinea approximans* and *S. rubescens* are not found below 300 feet.

Tornatellina antillarum is found sparingly at about 500 feet.

Helicina platycheila, and *H. fasciata* are not found lower than 800 feet.

Above 1000 feet *Helix Josephinae*, *H. nigrescens*, and *Amphibulina tigrina* are found.

Above 1500 feet *Cyclophorus Schrammi*, and *Helicina rhodostoma* appear while it is not until 2000 feet are reached that *Helix Baudoni*, *Bulimus virginialis*, *B. multifasciata*, *B. Nichollsii* and *Amphibulina patula* are met with.

Mr. Brown affirms the power of *A. patula* to completely retract itself within its shell, and hazards the conjecture that *A. pardilina* Guppy, may be referable to *A. tigrina* Lesuer, and that from the description *Cyclotus amethystinus* Guppy, is not a *Cyclotus* but a *Cyclophorus*, and probably *C. Schrammi* Shuttl.

Littorina litorea (L.) on the American coast.—By A. F. Gray.—Science News, April, 15 th, 1879.

This species was first noticed in Halifax, Nova Scotia, by Willis. It is common in the Bay of Chaleur, and is probably to be found in all suitable localities on the coast of New England as far as Long Island Sound.

The specimens at Beverley, Massachusetts, are large and fine-

ly developed equalling if not exceeding European examples in size, and exists there in immense numbers. The physical conditions under which the species exists in the localities where it is found in America seem peculiarly adapted to its increase and dispersal and it bids fair to soon surpass the native species in abundance.

Description of a *Partula* supposed to be new, from the Island of Moorea.—By W. D. Hartman, M.D.—Trans. of Acad. Nat. Sci. of Philadelphia, 1880, p. 229.

Partula Mooreana, from Vaianai Valley, Island of Moorea.

The surface of the shell is thickly crowded with waved spiral striæ, as in *P. spadicea*. The new species is arboreal, and not uncommon on bushes.

List of Brachiopoda or Lamp shells, found in Port Jackson, and the coast of New South Wales.—By John Brazier, C.M.Z.S., &c.—From the Proceedings of the Linnean Society of New South Wales, Vol. iv, p. 399.

An enumeration of the *Brachiopoda* found at the mentioned places, and submitted to Mr. Davidson, the species are *Magasella Cumingi*, and var., *Megerlia pulchella*, Sow., *Megerlia sanguinea*, and *Terebratulina cancellata*, var.

Kraussia Lamarckiana, has also recently been found by Mr. Brazier, at Double Bay, Port Jackson.

***Bythinia tentaculata*, (L.) in N. America.**—By W. M. Beauchamp,—American Naturalist, July, 1880, p. 523.

This shell was first found in June, 1879, at Oswego, N.Y., a little later in the Champlain Canal at Waterford and Troy, and early in 1880 plentifully in the Erie Canal at Syracuse, N.Y. In some localities it is already abundant.

Can Snails mend their shells.—By R. Bunker.—American Naturalist, July, 1880, p. 522.

A specimen of *Limnæa elodes*, Say had a piece taken from its shell about the size of a half-dime. At the end of a week the opening was perceptibly smaller, and the work of reparation proceeded until in six weeks the work was completed and the surface of the shell apparently as smooth as before it was broken.

Helix lapicida v. minor at Epsom.—By J. E. Daniel.—Science Gossip, July, 1879, p. 161.

The occurrence of this variety in some numbers on a wall at Downside, Epsom, is noted.

Pearls in Pecten maximus.—By J. E. Daniels.—Science Gossip, July, 1879, p. 161.

The occurrence of two small spherical pearls of a milky white color in *Pecten maximus* is recorded.

Testacella haliotoidea in Notts.—By R. A. Rolfe.—Science Gossip, Jan., 1879, p. 22.

Several specimens of this species are recorded as been taken in Notts., also *Limax brunneus*. From near Mansfield *Cochlicopa tridens*, *Clausilia laminata*, and *Helix lapicida*, are recorded.

Ancylus lacustris floating.—S. S. Pearce.—Science Gossip, Sep., 1879, p. 207.

The power of this species to float on the surface of the water as other *Limnææ* is here affirmed. Two specimens out of fourteen taken on the decayed leaves of *Iris pseudacorus* in an almost stagnant dyke near Lewes were observed in confinement to follow this habit—Mr. Pearce says "They appear to float in the same way

as other *Limnæadæ* with the exception that occasionally they swayed the forepart of their bodies from one side to the other, apparently in quest of a frond nearer to them than the one in a direct line, they also continually opened and shut their mouths, and generally carried the hind part of their shell closer to the tail than the forepart to the head, so that the shell appeared to have an oblique direction'.

Polymorphous Anodontæ.—By R. Ellsworth Call.—*American Naturalist*, July, 1880, p. 529.

The author from an examination of a large number of specimens of *Anodonta grandis* Say, *A. plana* Lea, *A. decora* Lea, *A. Hockingensis* Moore, MSS., and *A. Somersii* Moore, MSS., has decided that they are all forms of *grandis* Say.

In arriving at this decision, Mr. Call has made a very careful diagnosis of the exo-skeletons of all and the soft parts of some, and the opinion of their identity is further strengthened by the fact, that being arranged geographically from the East to the Mississippi, the former gradually approach the shell described by Say in 1829. The differences correspond in general with the modification of the mantle, some of them being sexual, but the major part may be explained on the basis of distribution and changes of environment.

Synonymy of and remarks upon Port Jackson, New Caledonian, and other shells, with their distribution.—By John Brazier, C.M.Z.S., &c.—From *Proceedings of the Linnean Society of New South Wales*, vol. iv., p. 388.

A paper devoted to rectification of the nomenclature of some Australian marine shells, with the study of which Mr. Brazier's name is so intimately associated.

Corbula venusta Angas, is renamed SMITHIANA, the former being pre-occupied by Dr. Gould for a Japanese species.

Cerithiopsis clathrata Angas. The name *clathrata* is pre-occupied by H. and A. Adams for a species from Navigator Island, Semper's name *ANGASI* is therefore adopted.

The following species have their localities confirmed:—*Lampania angulifera* Sow., *Scutellina cinnamomea* Gld., *Paphia striata* Gmelin, *Lingula anatina* Lam., *L. hians* Swains., *Trigonia Lamarckii* Gray, *Cominella costata* Q. and G., *C. alveolata* Kein., *Haliotis iris* Martyn, and *Tritonium Quoyi* Reeve. *Cardium fornicatum* Sow., is recorded as collected by Lieut. Heurtél at Bourail, New Caledonia, in deep water.

The recent Marginellidæ of South Australia (From the Transactions of Philosophical Society, Adelaide, 1878).—By Prof. R. Tate, A.L.S., F.G.S., &c.

The family *Marginellidæ* previously unknown in South Australian waters, has been discovered by the author, who has found 5 *Marginella*, 2 *Hyalina* and 1 *Erato* to be resident there. Some of the species are described as follows:—*Marginella subbulbosa*, from Wauraltie, west side of Spencer's Gulf; *M. (Cryptospira) Cymbalum*, Aldinga Bay, St. Vincent's Gulf; *M. (C.) denticulata*, Wauraltie, west side of Spencer's Gulf; *M. (H.) tridentata*, Aldinga Bay, St. Vincents Gulf; *M. (H.) pallida*, Marino Beach, Holdfast Bay, and Aldinga, St. Vincent's Gulf; *Erato bimaculata*, Aldinga and Marino, St. Vincent's Gulf, Semaphore Beach on east coast, and Surveyor Point on west coast, also at Wauraltie, Spencer's Gulf. The other species enumerated are *M. (H.) volutiformis* Reeve, and *M. (H.) turbinata* Sowerby. The paper concludes with a tabular view of the distribution of the 36 species of Australian *Marginellæ*.

The Fossil Marginellidæ of Australasia (From the Transactions of the Philosophical Society of Adelaide, 1878).—By Prof. R. Tate, A.L.S., F.G.S., &c.

The family *Marginellidæ* is not known in rocks older than the Eocene, and the discovery of 18 fossil forms of this group justifies the assertion that the Australian area was their chief centre of habitation in the tertiary period. Of the eighteen species cited in this paper, twelve are new to science and are described by Mr. Tate. The new species are:—*M. Aldingæ*, Eocene Marl, Aldinga; *M. Cassidiformis*, near Hamilton, Victoria. Seven species—*M. muscarioides*, *M. nucula*, *M. inermis*, *M. Winteri*, *M. Woodsi*, *M. septemplicata* and *Erato minor* are from Muddy Creek, Victoria. *M. propinqua*, Miocene, Muddy Creek, and upper beds of R. Murray Cliffs, Victoria. *Erato Australis*. Eocene Marls, Aldinga, S. Australia. This important work is brought to a close by a conspectus of the species and valuable remarks on their affinities.

On a new species of Chiton (*Chiton scabridus*) lately found on the British coast (From the Annals and Magazine and Natural History, July, 1880).—By J. G. Jeffreys, LL.D., F.R.S.

This species was first collected by Mr. Pidgeon at Goodington, Torbay, and has since been found at Jersey by Mr. Duprey. When first submitted to Dr. Jeffreys by Mr. Pidgeon he considered it to be a variety of *C. cancellatus*, but subsequent communications from Mr. Duprey induced him to consider it distinct. The shell is not convex or gibbous like *cancellatus* and is proportionately broader, and the row of tubercles are half in number, more raised and coarser, giving a rough or scabrous aspect to the shell, there are also some differences in the animal. Mr. Duprey finds the species associated with *C. cancellatus* as well as *R. lactea* and *R. striatula* in the lower part of the littoral zone.

Tropical Mollusca recently dredged at Port Jackson Heads (From the Proceedings of the Linnean Society of

New Society of New South Wales, vol. iv., p. 428).—By J. Brazier, C.M.Z.S.

The species found are *Typhis arcuatus* Hds., *Nassa coronata* Lam., *Mitra pacifica* Reeve, *Senectus squamosus* Gray, *Buccinulus coccinatus* Reeve, *Tellina striatula* Lam., and *Chione marica* L.

Note on *Oniscia ponderosa* with its locality (From the Proceedings of the Linnean Society of New South Wales, vol. iv., p. 431).—J. Brazier, C.M.Z.S.

Oniscia ponderosa Hanley, of which the locality was formerly unknown, has been found at Penirihonen, N. coast of New Caledonia.

List of Land Shells found on Thursday Island with descriptions of the new species (From the Proceedings of the Linnean Society of New South Wales, vol. iv., p. 392).—By J. Brazier, C.M.Z.S.

Thursday Island is one of the Prince of Wales group in Torres Straits, and the species here described or enumerated were collected by Mr. Beddome in 1877. Four *Helices* (*Helix Kreffti*, *H. delessertiana*, *H. Spaldingi* and *H. Buxtoni*), *Bulimus Beddomei* and *Helicina reticulata* were found. The specimens of *H. Kreffti* are a pale horny green without the gloss of Darnley Island specimens. The *Helix Spaldingi* are keeled and are described as var. *carinata*. *Helix (Planispira) Buxtoni* is described as new, it bears some resemblance to dark varieties of *H. delessertiana* with the sculpture removed.

Manual of Conchology, structural and systematic, with illustrations of the species.—By George W. Tryon, jr., Vol. iii., part 9.

The third volume of this great work is devoted to the families *Tritonidæ*, *Fusidæ* and *Buccinidæ*. The *Tritonidæ* are divided

into 3 genera—*Triton* Montfort, *Distorsio* Bolt., and *Ranella* Lam. The genus *Triton* is subdivided into *Simpulum* Klein., *Cymatium* Bolten, *Gutturium* Klein., *Epidromus* Klein., and *Priene* H. and A. Adams.

Under the typical species *T. tritonis* L., the author places *T. nobilis* Conrad, as a var. and considers *T. Seguenza* Aradas and Benoit, as synonymous with it. *T. Sauliæ* Reeve, and *T. australis* Lam., are considered identical with *T. nodiferus* Lam. *T. fraterculus* Dunker, is thought to be same as *T. Bassi* Angas. He regards *T. Martinianus*=*Veliei* Calkins, *T. aquatilis* Reeve, *T. intermedius* Pease, and *T. vestitus* Hinds, as identical with *T. pilearis* L. *T. mundum* Gould=*T. gemmatus* Reeve. *T. labiosus* Wood, embraces the following, previously regarded as distinct:—*T. Loroisii* Petit, *T. Strangei* Ad. and Ang., and *T. orientalis* Nevill. *T. Ranzanii* Bianconi, is the same as *T. tigrinus* Brod. *T. grandimaculatus* is the same as *T. lotorium* L. The *T. moritinctus* Reeve, is *T. cynocephalus* Lam. *T. ægrotus* Reeve, is the same as *T. trilineatus* Reeve. *T. vespacens* Lam. has included under it *T. Thersites*, *T. elongatus* and *T. gracilis* Reeve. *T. cumingii* Dohrn, is a synonym of *clathratus* Sow. *T. testaceus* Mörch, and *comptus* Sow., are identical with *obscurus* Reeve. *T. pygmæus* Reeve, is the same as *reticulata* Blainv. *T. bracteatus* Hinds, receives *latevaricosus* and *bacillum* Reeve. *T. tessellatus* Reeve, is sunk in the *T. concinnus* Reeve. *T. Oregonensis* Redfield, is sunk in *cancellatus* Lam. *Distorsia cancellinus* Roissy, has *constrictus* Brod., *ridens* and *decipiens* Reeve, as synonyms

The genus *Ranella* is subdivided into *Lampas* Schum., *Aspa* H. and A. Ad., and *Argobuccinum* Klein. *Ranella albifasciata* Sow., is regarded as a var. of *nana* Sow. *R. bufonia* Gmel. receives as synonymic *tuberossissima* Reeve, *asperrima* and *Grayana* Dunker. *R. siphonata* Reeve, is considered the same

as var. *venustula* Reeve, of the same species. *R. rugosa* Sow., and *verrucosa* Sow., are the same as *cruentata* Sow. *R. Thomæ* D'Orbigny, is identical with var. *rhodostoma* Beck. *R. Thersites* Redfield is the same as *Californica* Hinds. *R. coriacea* Reeve, is a young state of *scrobiculator* L., *R. granifera* Lam., and *semigranosa* Lam. *R. affinis* Brod., receives the following:—*R. livida*, *R. ponderosa* and *R. Cubaniana*. *R. rosea* Reeve, *R. concinna* Dunker, *R. polychlorus* Tapp. Canef., are considered as varieties of *R. pusilla* Brod. *R. argus* Gmelin, receives *ranelliformis* King=*vexillum* Sow., and *R. proditor*.

The FUSIDÆ are next treated and are primarily divided into FUSINÆ, FASCIOLARIINÆ, PTYCHATRACTINÆ and PERISTERIINÆ.

The subfamily FUSINÆ embraces the genera *Fusus* Lam., *Afer* Conrad, *Clavella* Swains., *Buccinofusus* Conrad. The subfamily FASCIOLARIINÆ has the genus *Fasciolaria*. The subfossil PTYCHATRACTINÆ embraces *Ptychatractus* and *Meyeria*, and PERISTERIINÆ has *Peristernia*, *Latirus* and *Leucozonia*.

An enumeration and description of fossil genera and subgenera is also given. Nineteen plates enrich this part, illustrating a number of species, and also showing the dentition of some of the species.

Mollusca of H.M.S. "Challenger" Expedition.—By Rev. Robert Boog Watson, B.A., F.R.S.E., F.L.S., F.G.S.—Parts 1 and 2.

The Rev. Mr. Watson, in whose able hands the vast collection of mollusca (excepting Brachiopods, Cephalopods, Pteropods and Nudibranchs) gathered in these extensive explorations were placed for examination, has in this paper given us a first instalment of the valuable and important results achieved. Up to the time of publication of these parts, 2000 separate lots have been examined, including from 1200 to 1500 distinct species. The richness of

the results of the expedition in the vast number of new species discovered, and the careful and accurate way in which the dredgings are labelled and classified, constitutes an era in the science.

The SOLENOCONCHIA which comprises the genera *Dentalium*, *Siphodentalium* and *Cadulus*, is represented by 36 species, most of them new to science. Eighteen species of *Dentalium* are enumerated as having been found, of which 12 are named and described as new and a var. of *D. capillosum*—*paucicostatum* W.—is mentioned. The new species are *D. ægeum* Watson, Kerguelen Island, 110 f., in mud; *D. amphialum* W., off mouth of La Plata at 1900 f., grey mud; *D. ceras* W., Mid Pacific, E. of Japan, 2500 f., grey ooze; *D. diarrhox* W., N.E. from New Zealand, 700 f., grey ooze; *D. entalis* v. *orthrum* W., Setubal, 470 f., globigerina ooze: Fayal Azores, 450 f., sand: Prince Edward Island, 150 f.; *D. leptosceles* W., S. of Australia, 2600 f., red clay; *D. circumcinctum* W., Setubal, 470 f., globigerina ooze: Sombrero Island, St. Thomas, W.I., 450 f., globigerina ooze: Pernambuco, 350 f., mud; *D. acutissimum* W., N. of Papua, 1070 f.: Mid Pacific, E. of Japan, 2050 f., grey ooze; *D. compressum* W., N. of Culebra Island, St. Thomas, W.I., 390 f., mud; *D. didymum* W., N. of Culebra Island, St. Thomas, W.I., 390 f., mud; *D. Yokohamense* W., Yokohama, 8—14 f., mud; *D. tornatum* W., Levuka, Fiji, 12 f.

In SIPHODONTALIUM 7 species are noticed all new to science. —*S. platamodes* W., St. Thomas, 390 f., mud; *S. tythum* W., St. Thomas, 390 f., mud; *S. pusillum* W., Palma, Canaries, 1125 f., volcanic sand; *S. tetraschistum* W., Fernando, Noronha, 725 f.; *S. dichelum* W., Levuka, Fiji, 12 f.; *S. prionotum* W., Raine Island, C. York, 155 f., sand; *S. eboracense* W., Torres St., C. York, 3—11 f.

Of CADULUS 11 species are enumerated 9 of which are new.—*C. colubridens* W., N.E. of New Zealand, 700 f., grey ooze; *C. vulpidens* W., *C. rastridens* W., and *C. sauridens* W., Culebra Is., St. Thomas, W.I., 39 f., mud; *C. simillimus* W., Raine Island, C. York, 155 f., sand, and W. of C. York, 6 f., coral sand; *C. curtus* W., and var. *congruens* W., Culebra Island, St. Thomas, 390 f., mud; *C. obesus* W., *C. exiguus* W., and *C. ampullaceus* W., Culebra Island, St. Thomas, 390 f., mud.

The TROCHIDÆ embracing the genera *Seguenzia*, *Basilissa*, *Gaza* and *Bembix*, the three last being established for the reception of some of the peculiar species discovered in the voyage. Of *Seguenzia* 4 species are mentioned, 2 of them are new:—*S. ionica* W., Culebra Island, W.I., in mud at 390 f., and *S. trispinosa* W., Pernambuco, 675 f., mud; a new variety of *S. formosa* Jeff., is also described—*lineata*—from Pernambuco, in mud at 350 and 675 f. The new genus *Basilissa* W., is erected for 6 species.—*B. lampra* W., E. of Japan, 2050 f., grey ooze; *B. simplex* W., off mouth of La Plata, 1900 f., grey mud; *B. munda* W., off Palma, Canaries, 1125 f., fine volcanic sand; *B. alta* W., Culebra Island, St. Thomas, W.I., 390 f., mud, and off Pernambuco, 675 f., mud: a var. *oxytoma* W., is also from Pernambuco; *B. superba* W., E. of C. York, Australia, 1400 f. grey ooze; *B. costulata* W., off Culebra Island, W.I., 390 f., mud. A new genus *Gaza* is characterized for a shell from Fiji—*G. dædala* W., Kandavu, Fiji, 610 f., globigerina ooze. A new genus *Bembix* is also made for a shell from Japan—*B. æola* W., Mosima, Japan, 345 f., sandy mud.

New Texan Unio.—By R. Ellsworth Call.—American Naturalist, May, 1881, p. 290,

Unio Bollii, from Colorado river, Texas. It is most nearly allied to *U. quadrans*, Lea.

Note on *Succinea campestris* and *S. aurea*.—By R. Ellsworth Call.—*American Naturalist*, May, 1881, p. 391.

A record of the occurrence of *S. campestris*, at New Orleans, Louisiana, and Charleston, South Carolina.

Succinea aurea is noticed, as having been found at Richfield Springs, and Little Lakes, Otsego county, and at Staten Island, thus extending its range to western and central New York.

Unio pressus, Lea is also recorded from Desmoines river and Nishnabotna river, Iowa.

Freshwater deposits.—By L. E. Adams.—*Science Gossip*, May, 1881, p. 118.

The author gives the result of alluvium collecting at Maidenhead, after the flooding of the Thames. No less than 23 species of freshwater, and 24 species of land shells, were found, amongst which were *Bythinia Leachii*, *Zonites fulvus*, and v. *Mortoni*, *Helix pulchella* and v. *costata*, *Pupa marginata* and vars. *pygmea* and *edentula*, *Achatina acicula*, *Cyclostoma elegans*, and *Acme lineata*.

ERRATA.

The following mistakes have unfortunately occurred in the last number:—On p. 161, No. 48, *Natica canrena* (L.) At Key West, very fine and large specimens.—On p. 165, No. 101, for “carnestus” read “*carneolus*.”—On p. 169, No. 138, for “Florida” read “*Carolina*.”—On p. 170, Nos. 151, 152 and 153, for “South Carolina” read “*South Florida*.”—On p. 173, for “in the inland torrents, but one pond of fresh water” read “*as the island possesses but one pond of fresh water*.”

DESTRUCTION OF SHELL-LIFE BY FLOODS.

BY CHARLES ASHFORD.

In a former volume of this journal (ii., p. 322) appeared an interesting article by Mr. R. Scharff, in which he pointed out the advantage to the conchologist of examining material left on the banks of rivers after the subsidence of extensive floods. I can speak from experience to the value of his advice. Not only can we learn in a short time what species frequent the stream and its banks, but we can also form a tolerable estimate of the comparative abundance or scarcity of the different species. To those whose time is limited, or who desire numerous examples of the occurring kinds, the practice of bringing home, drying and winnowing a bagful of the stranded rubbish cannot be too strongly recommended though they must not expect to be often rewarded with so rich a "find" as fell to the lot of Mr. Scharff on the banks of the Garonne. Five-and-twenty years ago I acquired a very gratifying supply of *V. pusilla*, *V. substriata* and *V. minutissima*, not to mention common species, by bringing home and looking over with a feather a quantity of *débris* from the foot of limestone rocks in Yorkshire.

In the early part of last December my brother and I found from the examination of broken reeds and grasses left in a meadow by the subsidence of the R. Avon near Christchurch, among several other species both from land and water, a vast number of the young of *Succinea putris*. A few of larger growth were among them, but the bulk of the considerable heap of shells which remained after the winnowing, were from the preceding summer's spawn. These small shells, measuring two to three millimetres in length and weighing 80 to the grain, were as nearly as I could judge of about a fortnight's or three weeks' growth.

It would be unsafe to infer from this the probable time at which the eggs of *Succinea putris* are hatched, for closer observation showed that in nearly every case the winter epiphragm was formed, and it was uncertain how long the animals had remained in a dormant state. The flood, which had swept them from their winter moorings on the vegetation bordering the river, occurred in the last week of November. During the interval the greater part of them, if not all, had fallen a prey to tiny but voracious larvæ, probably of the smaller coleopterous insects. This was evident from the fact that nearly all the shells were neatly cleared of their contents to the very apex, a minute ragged fracture in the tender epiphragm showing the assailants' mode of access. It would be futile to attempt to estimate in numbers the enormous destruction which a few days had thus brought about in the case of one single species. Our little winnowing yielded more than two thousand young shells of *S. putris*, and what we brought away was not a thousandth part of what remained in the lately flooded meadows. This heavy death-roll proves how effective is one of many means by which the extension of each class of creatures is kept within those limits which are implied by the term "Balance of Animal Life."

OBSERVATIONS ON THE GENUS *ASTARTE*, WITH A LIST OF THE KNOWN RECENT SPECIES.

By EDGAR A. SMITH, F.Z.S.,
(Zoological Department, British Museum).

This genus was characterized by James Sowerby in 1816, in his work entitled "The Mineral Conchology of Great Britain." In it he describes several fossil forms, but at the same time distinctly states that the living *A. scotica* may serve as the type of the genus, and he also mentions *A. danmonia* as a second species. These two names are now always considered synonymous with

the older *A. sulcata* of Da Costa, which species will consequently stand as the type. Such being the case, Conrad* is wrong in upholding the subsequent name *Crassina* of Lamarck, for the recent species, and appropriating *Astarte* for the fossil forms. If the latter described by Sowerby really have different hinge characters from those of the living species, in my opinion Conrad should have given a new generic name to them. But perhaps he overlooked the above stated fact of Sowerby mentioning *A. scotica* as his type, or else he may not have seen the work at all.

SYNONYMY OF THE GENUS.

1816. **Astarte** J. Sowerby. Mineral Conchology, vol. ii., p. 85.
Type *A. scotica*.
1817. **Tridonta** Schumacher. Essai Nouv. Syst. vers. test.,
p. 146. Type *T. borealis*.
1818. **Crassina** Lamarck. Anim. Sans. Vert., vol. v., p. 554.
1819. **Nicania** Leach. Ross's Voyage, Appendix, p. 176. 1×11.
1822. **Goodallia** Turton. Conch. Ins. Brit., p. 76. Type *G. triangularis*.
1827. **Mactrina** Brown. Illus. Conch. Gt. Brit. & Ireland,
pl. xvi., f. 25. Type *M. triangularis*.
1872. **Rictocyma** Dall. American Jour. Conch., vol. vii.,
p. 151. Type *R. mirabilis*.

It is a matter of individual opinion whether the names *Goodallia* and *Rictocyma* be adopted as subgeneric divisions, the former for the minute smooth, ribless *A. triangularis*, and the latter for those species having the concentric costæ, especially towards the umbones, more or less wavy. The subgenus *Gonilia* of Stoliczka,† proposed for the *Astarte bipartita* of Philippi, is

* American Jour. Conch., vol. v., p. 46.

† Mem. Geol. Survey India, vol. iii., Paleont. Indica, 1871, p. 278.

perhaps worthy of retention, for the sculpture of that shell differs in a remarkable manner from that of other species.

The crenulation on the margin within the valves is of importance in the discrimination of species. In *A. borealis*, *A. rollandi*, *A. elliptica*, *A. fabula*, *A. compressa*, *A. quadrans*, *A. longirostra*, *A. acuticostata*, *A. compacta*, *A. mirabilis*, *A. esquimalti* and *A. fluctuata* it is never found, whilst it is always met with in adult specimens of *A. sulcata*, *A. crebricostata*, *A. undata*, *A. fusca*, *A. crenata*, *A. castanea*, *A. triangularis*, *A. bipartita* and *A. magellanica*.

C. F. Roemer* has expressed an opinion that this crenulation is formed only when the animal arrives at maturity or at the completion of a period of growth. Totten in 1835 noticed that the margin of the young and half-grown shells of *A. castanea* had their "margins perfectly smooth." A. A. Gould in 1841 says "it is perfectly certain, that no species of the genus is found with a crenulated margin until the shell has arrived at its full dimensions and the margin of the valves begins to thicken, as it always does, and then, so far as my observation goes, there is *always* a crenulated margin; so that this is a mark of maturity."

Dr. Gwyn Jeffreys however remarks that this "is opposed to my own observation (especially as regards *A. triangularis*)."
Dr. Malm suggested that the margins were denticulated when in the course of growth they met on a rib, but smooth when on a furrow. This theory cannot however be maintained, for *A. triangularis* produces crenules although ribless, and *A. bipartita* is likewise notched, yet the margins can neither meet upon or between the ribs, they being non-parallel with the growth of the

* De astartum genere et speciebus, quæ e saxis jurassis atque cretaceis proveniunt, Berolini 1842. Also a German translation by Dr. Ferd. Roemer in Leonhard and Bronn's neues Jahrbuch für Mineralogie, Geognosie, Geologie, &c., for 1843, pp. 58—74.

shell. Again other species (e.g., *A. elliptica*, *A. fabula* and *A. compressa*) are more or less ribbed yet always have smooth edges.

The result of my own observation upon this point coincides with the opinion expressed by Gould and Searles Wood, that in such species as have notched margins the crenulation is a mark of maturity. If it be not, how is it that we *never* find it in small and what appear half-grown shells, and always in those which are evidently very old. I have seen a great many specimens of *A. sulcata*, and on opening those which on account of the thickened margins of the valves I deemed adult, only in one instance have I been somewhat deceived. This particular shell exteriorly exhibited all the aspect of maturity, yet on parting the valves the margins seemed smooth. On a closer scrutiny however, I could certainly detect traces of incipient crenules. Who can say that this shell, had it been permitted to live a short time longer, would not have developed the crenulations? In my opinion such would have resulted. Jeffreys in the second volume of the "British Conchology," p. 310, says—"I have adult specimens of *A. sulcata* with the margin quite plain and smooth in front, but distinctly notched on each side."

Here is in my opinion a further instance where the specimen appears to have almost arrived at maturity (for I dispute the *assertion* of its adulthood), and consequently has partially completed the crenulation of the margin. There are also specimens of the same species in the British Museum in which the crenulation is indicated on the lateral edges only, so it would appear that the animal produces this feature first of all at that particular part.

The principal writers upon the recent species of *Astarte* are Hanley in his "Catalogue of recent bivalves," pp. 87, 88 and 350; *Philippi* in his "Abbildungen und Beschreibungen neuer

Conchylien," vol. ii., pp. 55—60, where a complete monograph of the then known species is given, illustrated by a plate. Sowerby wrote a monograph in the "Thesaurus conchyliorum," and another, a very bad copy of the former, in the "Conchologia Iconica." Perhaps a few remarks upon the latter may serve to show how inaccurate it is. In the first place to give an idea of its incompleteness, I may mention that only about thirty-eight of the seventy then published names which had been given to the species of this genus are referred to. Here also Mr. Sowerby's notorious misspelling of words is seen. *Tridonta* of Schumacher, is called *Tridenta*. *A. triangularis* is changed to *trigonularis*. Da Costa appears as Costa, Nilsson as Nilson and Möller as Muller. The statement that "all the species except the Mediterranean *A. fusca* inhabit northern seas" is manifestly incorrect, for one was already known from Patagonian regions, another from Florida, and two others from the Mediterranean. The *A. castanea* of eastern North America is erroneously assigned to "Arctic Seas," and it was not described by Say in the American Journal of Science, but in the Journal of the Acad. Nat. Sci. Philadelphia of 1822. Sowerby's figure also (fig. 1a) does not appear to represent this species, but rather a variety of *A. fusca* of Poli, for I do not find that the American shell is ever rayed. "*Astarte striata* Gray" should be *NICANIA STRIATA* Leach. "*A. multicostata*" was named by J. Smith and not by Macgillivray. Blainville never described a "*Venus crassatella*," but merely gave a French name (*Vénus crassatelle*) to the *Venus danmoniensis* of Montagu. The anterior side of *A. quadrans* is longer, not "shorter." *A. crenata* Gray, was described by that author under the generic name of *Nicania* in the Appendix to "Parry's first Voyage," and is not a manuscript name as Sowerby infers, and throughout the monograph the umbones are termed "umboes." These are some of the errors occurring in the text, and the

pictorial portion of the monograph is equally unsatisfactory. The lithography is very coarsely executed, and the coloration deceptive; for instance, the epidermis of *A. crenata* is called "yellowish," but the figure depicts a brown shell smudged with yellow, not in the least like the specimen it is supposed to represent, an observation that will apply to all the figures taken from shells in the British Museum collection. In a word the monograph is most incomplete, inaccurate and misleading.

A chronological list of the various names published as species of *Astarte* is appended beneath, in which those which are considered synonymous with others, or as not belonging to the genus, and doubtful species are printed in italics.

- 1771. *Venus compressa* Linné=*Astarte*? sp.?
- 1776. *Tellina atra* Pallas=*borealis* (Ch.) Schum.
- 1778. ***Venus sulcata*** Da Costa=***Astarte sulcata***.
- 1784. *V. borealis* Chemnitz=***Astarte sulcata***, &c.
- 1791. ***Tellina fusca*** Poli=***Astarte fusca***.
- 1803. *Venus sulcata* Montagu=**castanea** Say.
- 1803. ***Mactra triangularis*** Mont.=***Astarte triangularis***.
- 1807. *Venus scotica* Maton & Rackett=**sulcata** Da Costa.
- 1808. *Venus danmonia* Montagu " = " "
- 1808. ***Venus compressa*** Montagu=***Astarte compressa***.
- 1814. *Venus incrassata* Brocchi=**fusca** Poli.
- 1817. ***Tridonta borealis*** (Chem. part) Schum.=***Astarte b.***
- 1817. *Venus montagui* Dillwyn=**compressa** Mont.
- 1818. *Crassina damoniensis* Lamarck=**sulcata** Da Costa.
- 1818. *Astarte plana* J. Sowerby=**borealis** (Ch.) Schum.?
- 1819. *Venus montacuti* Turton=**compressa** Mont.
- 1819. *Nicania banksii* Leach=**compressa**, var.
- 1819. *Crassina semisulcata* Leach=**borealis**, var.
- 1819. *Nicania striata* Leach=**compressa**, var.

1822. **Venus castanea** Say=**Astarte castanea**.
 1822. *Crassina striata* Nilsson=**compressa** Mont.
 1822. *Crassina borealis* Nilsson=**borealis** (Chemn.) Sch.
 1822. *Crassina sulcata* Nilsson=**elliptica** Brown.
 1824. *Crassina artica* Gray=**borealis** (Chem.) Sch.
 1824. **Nicania crenata** Gray=**Astarte crenata**.
 1825. *Crassina montagui* Gray=**compressa** Mont.
 1825. *Crassina subcordata* Gray=**Venus** sp.
 1827. **Crassina elliptica** Brown=**Astarte elliptica**.
 1827. *Crassina corrugata* Brown=**borealis** (Ch.) Sch.
 1827. *Crassina ovata* Brown=**elliptica** Brown.
 1827. *Crassina depressa* Brown=**borealis** (Ch.) Sch.
 1827. *Crassina convexiuscula* Brown=**compressa** Mont.
 1827. *Crassina obliqua* Brown=**compressa** Mont.
 1828. *Mactra veneriformis* Wood=**borealis**, var.
 1829. **Astarte lactea** Broderip & Sowerby=**borealis**, var.
 1829. **Astarte crassidens** Broderip & Sowerby=**castanea** Say.
 1829. *Venus (Crassina) petagnæ* Costa=**fusca** Poli.
 1835. **Astarte affinis** Cantraine=**fusca** Poli.
 1835. **Astarte procera** Totten=**castanea** Say.
 1836. **Lucina?** **bipartita** Philippi=**Astarte (Gonilia) bi-**
 partita.
 1839. *Crassina multicostata* J. Smith=**compressa** Mont.
 1839. *Crassina withami* J. Smith=**borealis** (Ch.) Sch.
 1839. *Crassina garensis* J. Smith=**elliptica** Brown.
 1840. **Astarte parva** Searles Wood.
 1841. **Astarte cyprinoides** Duval=**borealis** (Ch.) Sch.
 1841. **Astarte undata** Gould.
 1841. **Astarte quadrans** Gould.
 1842. **Astarte globosa** Möller=**compressa**, var.
 1843. *Crassina latisulca* Hanley=**undata** Gould.
 1843. **Astarte portlandica** Mighels=**quadrans** Gould.

- 1844. *Astarte pusilla* Forbes.
- 1845. *Astarte pulchella* Jonas=**compressa** Mont.
- 1845. *Astarte mactracea* Linsley=**Crassatella** sp.
- 1846. *Astarte lunulata* Conrad, is a **Crassatella**.
- 1846. *Astarte flabella* Conrad, is a **Cardita**.
- 1846. *Astarte triquetra* Conrad.
- 1847. *Astarte longirostra* d'Orbigny.
- 1847. *Astarte crebricostata* Forbes.
- 1848. *Astarte Pfeifferi* Philippia=**Crassatella**.
- 1850. *Astarte bilunulata* (Conrad) Jay=*lunulata* Conrad.
- 1852. *Astarte difficilis* Jay=sp. ? undescribed.
- 1852. *Astarte lævis* Jay=sp. ? undescribed.
- 1852. *Crassina britannica* (Leach) Gray=**sulcata** Da Costa.
- 1854. *Astarte subœquilatera* Sowerby=**crebricostata**, var.
- 1854. *Astarte oblonga* Sowerby=**crenata** Gray.
- 1854. *Astarte intermedia* Sowerby=**elliptica** Brown.
- 1854. *Astarte japonica* (Jay) Sowerby=**borealis** (Ch.) Sch.
- 1855. *Astarte richardsoni* Reeve=**borealis**, var.
- 1855. *Astarte fabula* Reeve.
- 1859. *Astarte rollandi* Bernardi.
- 1863. *Crassatella esquimalti* Baird=**Astarte esquimalti**.
- 1865. *Astarte compacta* Carpenter.
- 1866. *Astarte fluctuata* Carpenter.
- 1869. *Astarte lutea* Perkins=**crebricostata** Forbes.
- 1870. *Astarte modesta* (H. Adams) Jeffreys = **Crassatella modesta**.
- 1871. *Rictocyma mirabilis* Dall=**Astarte mirabilis**.
- 1872. *Astarte lens* (Stimpson) Verrill=**crebricostata** Forbes.
- 1874. *Asiarte mortoni* (Adams) Sowerby=**undata** Gould.
- 1874. *Astarte abbreviata* Sowerby=**compressa** Mont.
- 1874. *Astarte semilirata* Sowerby=**fabula** Reeve.
- 1874. *Astarte producta* Sowerby=**borealis**, var.

1874. *Astarte subtrigona* Sowerby=**borealis**, var.
 1876. **Astarte acuticostata** Jeffreys and Friele.
 1881. **Astarte magellanica** Smith.
 1881. **Astarte nana** Jeffreys.
 1881. **Astarte macandrewi** Smith.

Some of the above species do not in reality belong to the genus *Astarte*. The *Venus compressa* of Linné is altogether beyond recognition, and may either belong to this genus as suggested by some authors, or it may be a species of *Veneridæ*. The name *Crassina subcordata* was applied to the *Venus subcordata* of Montagu, by Gray (Annals of Philosophy, 1825, vol. ix., p. 136), which shell however undoubtedly belongs to the *Veneridæ*. *Astarte mactracea* Linsley (American Jour. Sci. Arts, 1845, vol. xlviii, p. 275, woodcut), is a *Crassatella*, to which genus *Astarte lunulata* of Conrad is also referable.

Astarte flabella Conrad (Proc. Bost. Soc. Nat. Hist., 1846, vol. iii., p. 24, pl. i., f. 3), from Florida, judging from the description and figure appears to be a small species of *Cardita*. *Astarte pfeifferi* of Philippi (Zeitschrift für Malakol., 1848, vol. v., p. 133), from Cuba, is a small form of *Crassatella*, and *A. difficilis* Jay, *A. lævis* Jay. and *A. japonica* Jay, are mere names unaccompanied by any descriptions or figures, the two first appearing in the catalogue of the collection of shells of that author (ed. iv., p. 35), and the third in Sowerby's "Thesaurus Conchyliorum." The *Gouldia modesta* of H. Adams, from Tunis, erroneously considered an *Astarte* by Jeffreys (Ann. Mag. Nat. Hist., 1870, vol. vi., p. 71), is a small form of *Crassatella*.

I.—ASTARTE ELLIPTICA BROWN.

1771. **Venus compressa** Lin. ?
 1822. **Crassina sulcata** Nilsson (non Da Costa). Kongl. Vetenskaps Acad. Handlingar, p. 187.

1827. **Crassina elliptica** Brown. Ill. Rec. Conch., 1, pl. xviii, f. 3; ed. 2, p. 96, pl. xxxviii, f. 3.
1827. **C. ovata** Brown. Edin. Jour. Nat. Geo. Sci., vol. i., p. 12, pl. i., f. 8; Ill. Rec. Conch., ed. 2, p. 96, pl. xxxviii, f. 11—12.
1839. **C. garensis** J. Smith. Wern. Mem., vol. viii., pp. 90—93.
1843. **C. elliptica** Hanley. Cat. Rec. Biv., p. 350, pl. xiv., f. 36.
1843. **Astarte elliptica** Macgill. Moll. Aberdeen, pp. 211 and 259.
1845. **A. semisulcata** Philippi (non Leach). Abbild., vol. ii., p. 57, pl. i., f. 10.
1848. **A. scotica** (partim) Middendorff. Malac. Ross., iii., p. 44, pl. xvi., f. 10—12.
1853. **A. elliptica** Forbes & Hanley. Brit. Moll., i., p. 459, pl. xxx., f. 8.
1854. **A. elliptica** Sow. Thes. Con., ii., p. 779, pl. clxvii., f. 4.
1854. **A. intermedia** Sow. Thes. Con., p. 779, pl. clxvii., f. 11.
1855. **Venus compressa** Linn. ? Hanley, Ipsa. Linn. Con., p. 454.
1863. **V. sulcata** partim Jeffreys. Brit. Con., vol. ii., p. 312; vol. v., pl. xxxvii., f. 2.
1866. **Astarte compressa** Packard. Mem. Bost. Soc. Nat. Hist., vol. i., p. 278.
1870. **A. elliptica** Gld. Invert. Mass., ed. ii., p. 124, f. 435-7.
1872. **A. sulcata** Meyer & Möbius (non Da Costa). Fauna Kieler Bucht., vol. ii., p. 97, f. 5—7.
1872. **A. elliptica** Dawson. Post Pliocene Geol. Canada, pl. vii., f. 4 (not good).
1872. **A. crebricostata** partim Tryon. Proc. Acad. Nat. Sci. Philad., 1872, p. 246.
1874. **A. elliptica** Sowerby. Con. Icon., vol. xix., f. 4.

1874. *Astarte intermedia*, id. l.c., f. 13.
 1875. *A. compressa* (Linn. Venus) Mörch. Arctic Man., p. 131.
 1878. *A. compressa* G. O. Sars. Norg. Arkt., Fauna, p. 53.

HABITAT.—Greenland, Finmark, Scotland, Newfoundland, east coast of northern United States, Baltic, Nova Zembla, Franz Joseph Land.

This species is readily separable from *A. sulcata*, the only one with which it is likely to be confounded, by its *generally* more elliptic or transversely elongate form and the *constant* absence of crenulation within the margin of the valves in *adult* specimens, although approximations of form are met with, still the prescence or absence of the crenulation at maturity determines the species.

2.—ASTARTE UNDATA GOULD.

1841. Invert. Mass., 1841, p. 80; ed. 2, p. 121.
 1841. *A. sulcata* Gld. (non Da Costa), l.c., f. 46; ed. 2, f. 432.
 1843. *A. undata* Mighels. Bost. Journ. Nat. Hist., vol. iv., p. 319.
 1843. *Crassina latisulca* Hanley, 1843. Rec. Biv., p. 87 (note); p. 350, pl. xiv., f. 35.
 1845. *Astarte undata* Philippi. Abbild., ii., p. 55, pl. i., f. 1.
 1854. *A. undata* Sow. Thes., vol. ii., p. 779, pl. clxvii., f. 12.
 1858. *A. undata* Adams. Genera, vol. ii., p. 484.
 1863. *A. sulcata* Jeffreys, partim. Brit. Con., ii., p. 315.
 1872. *A. sulcata* Tryon, partim. Proc. Acad. Nat. Sci. Philad., 1872, p. 247.
 1872. *A. undata* Verrill. Amer. Jour. Sci. and Arts, vol. iii., p. 287.
 1874. *A. undata* Sowerby. Con. Icon., xix., f. 11.
 1874. *A. mortoni* Sowerby, l.c., f. 14.

HABITAT.—Portland Harbour, Maine (Mighels). Eastport, Grand Manan, Newport, and other localities on the east coast of North America, also Newfoundland.

The fossil *A. omalii* of the Crag, agrees with this species in having broad ribs and deep interjacent furrows, but in that species the beaks are more produced, peculiarly flattened, more acute, and the apical angle much sharper. The edges of the lunule and hinder ligamental area are also much more sharply defined. These in my opinion are sufficient distinctions to separate these two forms. Dr. Gwyn Jeffreys however holds a different view, and unites both these with the *A. sulcata* of Da Costa. Verrill states that "this is by far the most abundant species on the northern coast of New England. It ranges from Cape Cod to Labrador."

3.—ASTARTE SULCATA DA COSTA.

- 1778. *Pectunculus sulcata* Da Costa. Brit. Conch., p. 192.
- 1784. *Venus borealis* (partim) Chem. Conch. Cab., vol. vii., p. 26, pl. xxxix., f. 413.
- 1807. *V. scotica* Maton & Rackett. Trans. Linn. Soc., vol. viii., p. 81, pl. ii., f. 3.
- 1808. *V. scotica* Montagu. Test. Brit. Suppl., p. 44.
- 1808. *V. danmonia*, id., l.c., p. 45, pl. xxix., f. 4.
- 1816. *Astarte danmonia* Mont. J. Sowerby, Min. Conch., vol. ii., p. 85.
- 1816. *A. scotica* M. & R. Sowerby, l.c.
- 1816. *A. sulcata* Da Costa. J. Sowerby, l.c.
- 1817. *Venus scotica* M. & R. Dillwyn, Cat. Rec. Shells, p. 167.
- 1817. *V. danmonia* Mont. Dillwyn, l.c.
- 1818. *Crassina danmoniensis* Lamarck. An. Sans. Vert., vol. v., p. 554 (the first p. 554).

1818. *Venus scotica* M. & R. Lamarck, l.c., p. 600.
1819. *V. sulcata* Turton. Conch. Dict., p. 235.
1819. *V. scotica*, id., l.c., p. 236.
1819. *Crassina scotica* Leach. Ross's Voy., p. 175.
- 1820—24. *Astarte danmoniensis* Sowerby. Gen. Shells, pl. lxiii, f. 1—3.
1822. *Crassina scotica* M. & R. Turton, Conch. Ins. Brit., p. 130, pl. xi, f. 3—4.
1822. *C. sulcata* Turton, l.c., p. 131, pl. xi, f. 1—2.
1825. *Venus danmoniensis* Blainville. Man. de Malacol., p. 557, pl. lxxv, f. 7.
1825. *Crassina scotica* M. & R. Gray, Ann. Philosoph., vol. ix, p. 136.
1825. *Venus scotica* M. & R. Wood, Index Test., pl. vii, f. 20.
1825. *Venus danmonia* Mont. Wood, l.c., f. 21.
1827. *Crassina danmoniensis* Lam. Brown, Ill. Rec. Con., pl. xviii, f. 1; ed. 2 (1844), p. 95, pl. xxxviii, f. 1.
1827. *C. scotica* M. & R. Brown, l.c., pl. xviii, f. 9; ed. 2, pl. xxxviii, f. 9.
1827. *C. danmoniensis* Crouch. Intro. Conchol., pl. vi, f. 7.
1828. *Astarte scotica* Fleming. Brit. Anim., p. 440.
1829. *A. danmoniensis* Sowerby. Conch. Man., f. 110.
1830. *Crassina danmoniensis* Lam. Deshayes, Ency. Method, vers, vol. ii, p. 77.
1835. *C. danmoniensis* Desh. Anim. d. Vert., ed. 2, vol. vi, p. 257.
1835. *Venus scotica* M. & R. Desh., l.c., p. 360.
1841. *Crassina danmoniensis* Lam. Delessert Recueil, pl. vii, f. 1.
1841. *Astarte danmoniensis* Reeve. Conch. Syst., pl. lxvi, f. 1—3.
1843. *Crassina scotica* M. & R. Hanley, Cat. Rec. Biv., p. 87.

1843. *Crassina sulcata* Da Costa. Hanley, l.c., p. 87.
1843. *Astarte danmoniensis* Lam. Macgillivray, Moll. Aberdeen, pp. 211 and 258.
1843. *A. sulcata* Da Costa. Macgillivray, l.c., pp. 211 & 259.
1845. *A. sulcata* Da Costa. Philippi, Abbild., vol. ii., p. 56, pl. i., f. 4.
1845. *A. scotica* M. and R. Philippi, l.c., pl. i., f. 3.
1846. *A. scotica* M. and R. Lovén, Ind. Moll. Scand., p. 36.
1846. *A. sulcata* Da Costa. Reeve, Elem. Conch., vol. ii., p. 114, f. 186.
1848. *A. scotica* partim Middendorff. Malac. Ross., pt. iii., p. 44, pl. xvii., f. 1—2.
1848. *A. danmoniensis* Midd., l.c., f. 3.
1852. *Crassina britannica* Leach (MS., 1820). Moll. Brit. Synopsis, p. 302.
1853. *Astarte sulcata* Da Costa. Forbes and Hanley, Brit. Moll., vol. i., p. 452, pl. *m*, f. 5 (as *A. danmoniensis*), and pl. xxx., f. 6.
1854. *A. sulcata* Sowerby. Thes. Con., vol. ii., p. 778, pl. clxvii., f. 1—3.
1858. *A. sulcata* Adams. Gen. Recent Shells, vol. ii., p. 483, vol. iii., pl. cxv., f. 6—6*b*.
1862. *Crassina danmoniensis* Chenu. Man. Conch., vol. ii., f. 616.
1863. *Astarte sulcata* partim Jeffreys. Brit. Conch., vol. ii., p. 311, vol. v., pl. xxxvii., f. 1.
1874. *A. sulcata* Sowerby. Con. Icon., vol. xix., pl. i., f. 3*a*—*b*.
1881. *A. sulcata* Jeffreys. P. Z. S., p. 711.

HABITAT.—Coast of Spain (McAndrew); Great Britain, Greenland, North America, Norway, Nova Zembla, Sea of Okhotsk, &c.

By some authors the North American *A. undata* of Gould, is considered a variety of this species, however it seems to me very inconsistent on their part to deny specific rank to that form, and accord it to the *A. crebricostata* of Forbes, the one having very few and the other very many concentric ridges, or in other words fewer or more than the typical *sulcata*. All have the crenulated edge to the valves. Beyond this difference in the number of *costæ* only feeble distinctions can be pointed out. The posterior cessation of the ribs in *crebricostata*, remarked upon by Forbes and Hanley, to a certain extent occurs in this species and also in *undata*. These three species together with the *A. crenata* Gray and *A. fusca* Poli, are closely related, and I admit, taking into consideration the many intermediate and connecting forms which I have seen, that I cannot draw a line of demarcation. However the typical form of each is very distinct and at once recognizable, and although some puzzling intermediate grades are met with, still I prefer to allow these so-called species to retain separate specific names, for I do not pretend to say that hereafter characters will be found in the animals which will definitely distinguish such vastly different shells as *A. undata* and *A. crenata*. Placing these two side by side I cannot believe it advisable to designate them by one and the same name.

4.—ASTARTE FUSCA POLI.

- 1791. **Tellina fusca** Poli. Test. Ut. Sicil. I., pl. xv., f. 32—3.
- 1814. **Venus incrassata** Brocchi. Conch. Foss. Subap., vol. ii., pp. 557 and 670, pl. xiv., f. 7.
- 1829. **V. petagnæ (Crassina)** Costa. Cat. Sistem. test. due Sicilie, p. 34—5, pl. ii., f. 9a—b.
- 1835. **Crassina fusca** Deshayes. Anim. s. vert., ed. 2, vol. vi., p. 257.
- 1835. **C. incrassata** Deshayes, l.c.

1835. *Astarte affinis* Cantraine. Diagnoses esp. Nouv. Moll., p. 28.
1836. *A. incrassata* Philippi. Enum. Moll. Sicil. I., p. 38, vol. ii., p. 29.
1839. *A. incrassata* Phil. Wiegmann's Arch. Natur., vol. i., p. 125.
1845. *A. fusca* Philippi. Abbild., vol. ii., p. 57, pl. i., f. 5—7.
1854. *A. fusca* Sowerby. Thes. Con., vol. ii., p. 783, pl. clxvii., f. 24.
1863. *A. sulcata* partim Jeffreys. Brit. Con., vol. ii., p. 314.
1873. *A. fusca* Sowerby. Con. Icon., vol. xix., f. 17a—b.

HABITAT.—Mediterranean and Canary Islands.

This Mediterranean form appears to me to differ sufficiently from the more northern *A. sulcata* to warrant its specific distinction. Its smaller size, more triangular form, decidedly feebler ribbing, richer brown colour, not unfrequently varied with rays of a paler or darker tint are characters parting it from that species.

5.—ASTARTE CREBRICOSTATA FORBES.

1847. *Astarte crebricostata* Forbes & MacAndrew. Ann. Mag. Nat. Hist., vol. xix., p. 98, pl. ix., f. 4.
1853. *A. crebricostata* Forbes & Hanley. Brit. Moll., vol. i., p. 456, pl. xxx., f. 9.
1854. *A. crebricostata* Sowerby. Thes. Con., vol. ii., p. 780, pl. clxvii., f. 10.
1869. *A. lutea* Perkins. Proc. Bost. Soc. Nat. Hist., 1869, vol. xiii., p. 150, cut. *No. = undata var.*
1870. *A. crebricostata* Gould. Invert. Mass., ed. 2, p. 126, f. 440.
1872. *A. lens* Verrill. Amer. Jour. Sci. and Arts, vol. iii., p. 287. *Not crebricostata Fbs.*
1874. *A. crebricostata* Sowerby. Con. Icon., vol. xix., f. 10.

1874. *Astarte crebricostata* Möbius. Zweite Deutsche Nordpolarfahrt, vol. ii., p. 252. = *crenata* Gray!
1875. *A. crebricostata* Mörch. Arctic Manual, p. 131.
1878. *A. crebricostata* Sars. Norges Arkt. Fauna, p. 54, pl. v., f. 7a—b.
1879. *A. crenata* (non Gray) Norman. Journ. of Conch., vol. ii., p. 44.
1880. *A. crenata* (non Gray) Verrill. Proc. U.S. National Mus., p. 399.

Var. ASTARTE SUBÆQUILATERA SOWERBY.

1854. *Astarte subæquilatera* Sowerby. Thes. Con., vol. ii., p. 780, pl. clxvii., f. 13.
1874. *A. subæquilatera*, id. Con. Icon., vol. xix., f. 5.

HABITAT.—Finmark, Lofoden Islands; var. *subæquilatera*, Newfoundland; var. from East Greenland (Möbius).

The synonymy of this species given by Tryon in the Proc. Acad. Nat. Sci. Philad., 1872, p. 246, is most remarkable. Under this species amongst others are included—*A. elliptica*, *A. portlandica*, *A. quadrans* and *A. incrassata* Brocchi, the latter being held distinct from *A. fusca* of Poli!!

Mr. Verrill considers the American form “unquestionably distinct” from the European. He observes that it is “more compressed, more rounded, lighter and brighter yellowish in colour, and generally has much more numerous and regular undulations. The hinge is also quite different.” On the contrary Gould in speaking of this shell observes “In the way of form there is nothing to distinguish this species from others. It undergoes all the variations of altitude and elongation, of acumination and truncation, inflation and compression, that are observed in others.” I have not been able to examine any American specimens so cannot express any definite opinion

respecting the propriety of separating the *A. lens*, but I fail to find any sufficient differences in the description given by Gould.

6.—ASTARTE CRENATA GRAY.

1824. **Nicania crenata** Gray. Parry's First Voy. Apend., p. ccxlii.; Zool. Jour., vol. i., p. 119.
 1843. **Crassina crenata** Hanley. Cat. Rec. Biv., p. 88.
 1854. **Astarte oblonga** Sowerby. Thes. Con., vol. ii., p. 781, pl. clxvii., f. 19.
 1872. **A. oblonga** Tryon. Proc. Acad. Nat. Sci. Philad., p. 247.
 1874. **A. crenata** Sowerby. Con. Icon., vol. xix., f. 9a—b.

HABITAT.—Prince Regent's inlet, north of British North America (Capt. Sir E. Parry, R.N.)

This species may be distinguished from *crebricostata* by its smaller size and the very much finer concentric riblets which extend from the anterior end over about two thirds of the surface of the valves, leaving the hinder portion merely finely striated. The form too, judging from the fourteen specimens in the museum, is more elongate transversely and appears to be constant in this respect. The inner edge of the valves as in the other species of the genus which have crenulated margins, only become denticulate when maturity is reached.

7.—ASTARTE ACUTICOSTATA JEFFREYS & FRIELE.

1876. **A. acuticostata** J. & F. Nyt Magazin for Naturvidenskaberne, vol. xxiii., part 3.
 1877. **A. acuticostata** Kobelt. Jahrbuch. Deutsch. Mal. Gesell., vol. iv., p. 257.
 1879. **A. acuticostata** Friele. Jahrbuch. Deutsch. Mal. Gesell., vol. vi., p. 267, pl. iv., f. 8.
 1881. **A. acuticostata** Jeffreys. P. Z. S., p. 711, pl. lxi., f. 9.

HABITAT.—North Atlantic, in the cold zone at various depths of 290, 418, 488 and 510 fathoms; also between Scotland and the Faroe Islands, and Nova Zembla.

A quadrangular species approaching *A. sulcata*, but of small size, with remarkably erect, fine, numerous ribs, and with a plain edge to the valves and a narrow hinge.

8.—ASTARTE NANA JEFFREYS.

HABITAT.—Off Conch Reef, Gulf of Florida, 60 fathoms (Pourtales).

This interesting little species will be fully described by Dr. Gwyn Jeffreys. It is thickish in proportion to its small dimensions, strongly concentrically ridged and furrowed, of somewhat quadrate form, and covered with a thin pale, greyish epidermis. The inner margin of the valves, judging from the few specimens at present known, appear to be smooth. *The adult is over 1/2 inch.*

9.—ASTARTE CASTANEA SAY.

- 1803. *Venus sulcata* Montagu. Test. Brit., vol. i., p. 131.
- 1807. *V. sulcata* Maton and Rackett. Trans. Linn. Soc., p. 81, pl. ii., f. 2.
- 1817. *V. sulcata* Dillwyn. Cat. Rec. Sh., vol. i., p. 166.
- 1818. *V. sulcata* Lamarck. An. s. Vert., vol. v., p. 592.
- 1822. *V. castanea* Say. Journ. Acad. Nat. Sci. Philad., vol. ii., p. 273.
- 1827. *Crassina sulcata* Brown. Ill. Rec. Conch., pl. xviii., f. 10.
- 1828. *Astarte sulcata* Fleming. Brit. Animals, p. 439.
- 1829. *A. crassidens* Brod. & Sow. Zool. Jour., vol. iv., p. 364. *5/*
- 1830. *A. castanea* Say. Amer. Conch., pl. i.
- 1831. *A. castanea* Conrad. Amer. Mar. Conch., p. 72, pl. xvii., f. 3.
- 1835. *Crassina castanea* Deshayes. An. s. Vert., ed. 2, vol. vi., p. 258.

1835. *Astarte castanea*? var. *procera* Totten. Amer. Jour. Sci. Arts, vol. xxviii., p. 348—9, f. 2a—2f.
1841. *A. castanea* Gould. Invert. Mass., p. 76, f. 45.
1843. *A. castanea* De Kay. Zool. New York, part v., p. 220, pl. xxviii., f. 280.
1843. *Crassinacastanea* Hanley. Rec. Biv., p. 88, pl. ix., f. 27.
1845. *Astarte castanea* Philippi. Abbild., vol. ii., p. 57, pl. i., f. 2.
1853. *A. castanea* Forbes & Hanley. Brit. Moll., vol. i., p. 470.
1854. *A. castanea* Say. Sowerby, Thes. Con., vol. ii., p. 782, pl. clxvii., f. 14—15.
1854. *A. crassidens* Sow., l.c., p. 782.
1870. *A. castanea* Gould. Invert. Mass., ed. 2, p. 117, f. 431.
1872. *A. castanea* Tryon. Proc. Acad. Nat. Sci. Phil., p. 245.
1872. *A. crassidens*, id., l.c., p. 245.
1874. *A. castanea* Sowerby. Con. Ic., vol. xix., f. 1b.

HABITAT.—East coast of United States; Icy Cape (Belcher).

The *A. crassidens* of Broderip and Sowerby, is remarkable for its great size and the coarseness of the crenulation, having “almost the appearance of low embrasures” (B. & S.)

Dr. Jeffreys’ observation in the Annals Mag. Nat. Hist., Oct., 1872, p. 239, that this species is “perhaps a variety of *A. borealis* Chem.,” is certainly erroneous, for there is no connection between these two forms, one (*castanea*) being a species with crenulated, and the other with smooth margins to the valves.

10.—ASTARTE QUADRANS GOULD.

1841. *Astarte quadrans* Gould. Invert. Mass., ed. i., p. 81, f. 48.
1843. *A. portlandica* Mighels. Proc. Bost. Soc. Nat. Hist., vol. i., p. 129.

1843. *Astarte quadrans*, id. Journ. Bost. Soc. Nat. Hist.,
vol. iv., pp. 320 and 345, pl. xvi., f. 2.
1843. *A. quadrans* Migh. Bost. Jour. Nat. Hist., vol. iv., p. 319.
1851. *A. quadrans* Stimpson. Shells of New England, p. 18.
1851. *A. portlandica*, id., l.c., p. 18.
1854. *A. quadrans* Sowerby. Thes. Con., vol. ii., p. 782,
pl. clxvii., f. 5.
1870. *A. quadrans* Gould. Invert. Mass., ed. 2, p. 123, f. 434.
1870. *A. portlandica*, id., l.c., p. 127, f. 441.
1872. *A. quadrans* Verrill. Amer. Jour. Sci. and Arts, vol. iii.,
p. 287.
1874. *A. quadrans* Sowerby. Con. Icon., vol. xix., f. 8.

HABITAT.—Various localities on the east coast of the United States.

I am unable to distinguish the *A. portlandica* of Mighels, from this species. Of the two characters especially referred to by that author, namely, its extraordinary obliquity and the livid color of the interior, the former is unquestionably possessed by some examples of this species. The latter peculiarity seems to me possibly or rather probably due to discoloration produced by retention in the stomach of a haddock from whence the single shell described was extracted.

Jeffreys (Annals Nat. Hist., Oct., 1872, p. 239), erroneously I think, considers this a variety (*nana*) of *A. castanea*. Although I have not been able to compare it with young specimens of that species, still on placing it side by side with the umbonal portion of half grown specimens it appears to me different in form, being shorter from the beak to the opposite or ventral margin.

11.—ASTARTE BOREALIS (CHEM.) SCHUMACHER.

1776. *Tellina atra* Pallas (not described). Middendorff, Mal. Rossica, vol. iii., p. 47.

1784. **Venus borealis** partim Chemnitz. Con. Cab., vol. vii., p. 26, pl. xxxix., f. 412 only.
1808. **V. compressa** partim Montagu. Test. Brit. Suppl., pl. xxvi., f. 1, on middle of plate.
1817. **Tridonta borealis** Chem. restricted, Schumacher. Essai. Nouv. Syst. Vers. Test, p. 147.
1818. **Astarte plana** J. Sowerby. Min. Conch., vol. ii., p. 173, pl. clxxix., f. 2, perhaps.
1819. **Crassina semisulcata** Leach. Ross. Voy. Append., p. 175; Ann. Philosoph., 1819, p. 204.
1822. **C. borealis** Nilsson. Kongl. Vetenskaps-Acad. Handlingar, 1822, p. 188, pl. ii., f. 3—5.
1824. **C. arctica** Gray. Parry's First Voy. Append., p. ccxliii.; Zool. Journ., vol. i., p. 119.
1825. **C. borealis** Chemn. Gray, Ann. Philos., vol. ix., p. 136.
1827. **C. compressa** Brown. Illus. Rec. Con., ed. 1, pl. xviii., f. 45; ed. 2, pl. xxxviii., f. 4—5.
1827. **C. corrugata** Brown, l.c., ed. 1, pl. xvi., f. 24; ed. 2, pl. xl., f. 24.
1827. **C. depressa** Brown, probably, l.c., ed. 1, pl. xviii., f. 2; ed. 2, pl. xxxviii., f. 2. ? *arctica* var.
1828. **Mactra veneriformis** Wood. Ind. Test. Suppl., pl. i., f. 8. = *borealis*
1829. **Astarte lactea** Broderip and Sowerby. Zool. Journ., vol. iv., p. 365; Zool. Beechey's Voy., p. 152, pl. xlv., f. 12.
1839. **Crassina withami** J. Smith. Brown, Wenerian Mem., vol. viii., p. 105, pl. i., f. 21.
1841. **Astarte lactea** B. & S. Gould, Invert. Mass., p. 80, f. 47.
1841. **A. cyprinoides** Duval. Revue Zool., p. 278.
1843. **Crassina lactea** B. & S. Hanley, Cat. Rec. Biv., p. 88

1843. *Astarte compressa* Mont. Macgillivray, Moll. Aberdeen, pp. 211 and 261.
1843. *Crassina arctica* Gray. Hanley, Cat. Rec. Biv., pp. 88 and 350, pl. xiv., f. 40.
1845. *Astarte borealis* Linn. Philippi, Abbild., vol. ii., p. 58, pl. i., f. 11.
1848. *A. corrugata* Brown. Middendorff, Mal. Ross., part 3, p. 46, pl. xvii., f. 4—10.
1853. *A. arctica* Gray, Forbes and Hanley. Brit. Moll., vol. i., p. 461, pl. xxx., f. 7.
1854. *A. arctica* Sowerby. Thes. Con., vol. ii., p. 780, pl. clxvii., f. 17, 18 and 20.
1854. *A. semisulcata* Leach. Sowerby, l.c., p. 781, pl. clxvii., f. 16.
1854. *A. lactea* B. & S. Sowerby, l.c., p. 781, pl. clxvii., f. 21, 22 and 23.
1855. *A. richardsoni* Reeve. Belcher's Last Arctic Voy., vol. ii., p. 39, pl. xxxiii., f. 7a—b. = *borealis* 30.
1867. *A. islandica* Deshayes. MS.? in Mus., Cuming.
1872. *A. borealis* Chemn. Meyer and Möbius, Fauna Kieler Bucht, vol. ii., p. 95, f. 1—4.
1872. *A. lactea* B. & S. Dawson, Post. Pliocene Geol. Canada, pl. vii., f. 3.
1874. *A. semisulcata* Leach. Sowerby, Conch. Icon., f. 12.
1874. *A. lactea* B. & S., id., l.c., f. 18. = *arctica*
1874. *A. producta*, id., l.c., f. 19. = *borealis*
1874. *A. subtrigona*, id., l.c., f. 20. = *arctica*
1874. *A. arctica* Gray, id., l.c., f. 21a—b. "
1875. *A. (Tridonta) semisulcata* Leach. Mörch, Arctic Manual, p. 132.
1877. *A. semisulcata* Leach. Smith, Ann. Mag. Nat. Hist., vol. xx., p. 142.

1878. *Tridonta borealis* Chemn. Sars, Norg. Arkt. Fauna, p. 50.

HABITAT.—West Greenland, east coast of United States, Spitzbergen, Iceland, North Russia, Nova Zembla, Franz Joseph's Land, Behring's Sea, Norway, Lofoden Islands, &c.

The shell described by Linné as *Venus borealis*, judging from the diagnosis and the specimen in his cabinet is, according to Hanley, the *Lucina radula* of Lamarck,* but the figure he refers to represents the *Scrobicularia piperita* of Gmelin. On the contrary Römer† observes that it “gehört hiernach immer noch zu deu zweifelhaften arten.” The specimens figured by Chemnitz‡ under this name, are referable to more than one species of *Astarte*. Figures 412 and perhaps 414 in my opinion represent one species, which may retain the name *borealis* for reasons hereafter stated, and a specimen of *A. sulcata* Da Costa, is doubtlessly depicted by figure 413. Considering Chemnitz's confused notion of Linne's species, and the fact that one of the shells he described and figured had previously been named by Da Costa, it seems to me it would have been advisable to reject his name *borealis*, and to have employed that (*semisulcata*) given by Leach, that being the first name subsequently published had not Schumacher in 1817, two years prior to the publication of Leach's name, restricted the Chemnitzian species. In his “Essai d'un Nouveau Système des habitations des vers testacés,” p. 147, he refers to Chemnitz, plate xxxix., figure 412 only, thus limiting the species, observing—“notre coquille (figured in his plate xvii., f. 1) n'est que finement striée, et c'est exactement la même coquille de Mr. Chemnitz que se trouve classée dans la Collec-

* Hanley, *Ipsa Linnæi Conchylia*, p. 77. † Kritische Untersuch. Venus, pp. 92-4.

‡ Conchylien Cabinet, vol. vii., p. 26, pl. xxxix., f. 412-4.

tion de Mr. Spengler, comme variété de la *Venus borealis* de Linnæus."

Although the variety *semisulcata* Leach, is generally fairly recognisable by its more compressed form and stronger sculpture, especially towards the beaks, still all the intermediate and connecting links between it and typical examples of *A. borealis* are met with, and it becomes a matter of impossibility to draw any fixed line of demarcation. To the typical form belong *atra* Pallas teste Middendorff, *borealis* Nilsson, *compressa* Martens partly, *corrugata* Brown, *depressa* Brown perhaps, and *cyprinoides* Duval, and the following more closely approach the variety *semisulcata*, viz. :—*veneriformis* Wood, *lactea* Broderip and Sow., and *richardsoni* Reeve.

12.—ASTARTE ROLLANDII BERNARDI.

Jour., de Conchyl., 1858, vol. vii., p. 386, pl. xiii., f. 4.

HABITAT.—Petropaulovski, Kamtchatka.

This species is remarkable on account of its very circular form and the great thickness of the hinge. It appears to approach more closely *A. borealis* than any other species.

13.—ASTARTE FABULA REEVE.

1855. **A. fabula** Reeve. Belcher's Last Arctic Voy., vol. ii., p. 398, pl. xxxiii., f. 5a—b.

1874. **A. semilirata** Sowerby. Con. Icon., vol. xix., f. 15.

1877. **A. fabula** Smith. Annals Mag. Nat. Hist., Aug., 1877, vol. xx., p. 144.

1877. **A. fabula** Jeffreys. Annals Mag. Nat. Hist., Sept., 1877, vol. xx., p. 234.

HABITAT.—Dumbbell Harbour and Discovery Bay (Feilden); Regent Inlet (Ross); Cape Bowen (Dr. Sutherland); Franz Joseph's Land (Leigh Smith).

This species does not appear to attain a large size. The largest specimens exceed in this respect any of *A. compressa*, yet are considerably smaller than half-grown examples of *A. borealis*.

The peculiarity of this species consists in the character of the concentric ridges near the umbones. In this region they are more strongly developed than elsewhere, and indeed they *rarely* extend beyond the middle of the valves, the lower half being merely concentrically striated. They have too, a somewhat wrinkled or undulated appearance and are not produced quite to the margins, so that the dorsal areas (the umbones being towards the eye) appear comparatively smooth. In the volume of the *Annals* I referred to, I suggested the possibility of the *A. banksii* of Gould (*Invert. Mass.*, ed. 2; p. 125, f. 438), being the same as this species. However, I now believe this not to be the case, and that this shell, which is certainly not a typical *A. banksii* of Leach, is nevertheless a form of the *A. compressa*.

In the "*Annals*" Dr. Jeffreys observes—"I am now satisfied that *A. warehami* of Hancock is not this species, but the same as *Crassina depressa* of Brown = *A. crebricostata* Forbes = *A. richardsoni* Reeve." This appears to me a most unfortunate "lumping of species," for I imagine at least three of these are distinct. *A. warehami* is described as elliptical in form, with about sixty fine, close, sharp, regular, concentric ribs. The epidermis is of a pale greenish yellow, and the basal margin of the valves is said to be entire, by which I presume is meant not crenate.

A. crebricostata is generally rather triangularly ovate, has from thirty to forty ribs, coarser than those in *warehami*, the epidermis is yellowish or olive-yellow and the valves are crenated within in adult shells. *A. richardsoni* of Reeve, I consider the same as the variety *semisulcata* of *A. borealis*. It is described as "trigono-orbicularis, convexo-compressa, præcipue ad umbones,

valvis circa umbones confertim sulcatis, deinde lævibus;" and the interior of the margin is smooth, as in the species I refer it to. *A. depressa* of Brown, is a more doubtful species, neither the figure or description applying well to any recent species with which I am acquainted.

14.—ASTARTE COMPRESSA MONTAGU.

1808. **Venus compressa** Montagu partim (non Linn.)
Test. Brit. Suppl., p. 43, pl. xxvi., f. 1 $\frac{1}{2}$ at top.
1817. **V. montagui** Dillwyn. Rec. Shells, vol. i., p. 167.
1819. **V. montacuti** Turton. Conch. Diction., p. 243.
1819. **Nicania striata** Leach. Ross. Voy. Append., p. 176; ^{1x11}
Thomson's Ann. Phil., 1819, vol. xiv., p. 204.
1819. **N. banksii** Leach. Ross., p. 176; Ann. Phil., p. 204.
1822. **Crassina striata** Nilsson. Kongl. Vetenskaps. Acad.
Handlingar, p. 189, pl. ii., f. 6.
1822. **Cyprina compressa** Turton. Conch. Ins. Brit., p. 136
pl. xi., f. 22—2.
1825. **Venus Banksii** Blainville. Man. Malacol., p. 558.
1825. **Crassina banksii** Gray. Ann. Phil., vol. ix., p. 136.
1825. **C. montagui** Gray. Ann. Phil., vol. ix., p. 136.
1827. **C. striata** Brown. Ill. Rec. Conch., ed. 1, pl. xviii.,
f. 6—8; ed. 2, pl. xxxviii., f. 6—8.
1827. **C. convexiuscula** Brown. Ill. Conch., pl. xviii., f. 7.
1827. **C. obliqua** Brown, l.c., f. 6.
1828. **Astarte compressa** Fleming. Brit. Anim., p. 440.
1839. **A. banksii** Sowerby. Beechey's Voy., p. 152, pl. xlv.,
1839. **A. striata**, id., l.c., f. 10 (non 9). [f. 9 (non 10).]
1839. **Crassina multicostata** J. Smith. Brown, Mem.
Wern. Nat. Hist. Soc., vol. viii., p. 104, pl. i., f. 19.
1842. **Astarte banksii** Sab. Möller, Naturhist. Tidsk., p. 92.
1842. **A. striata**, id., l.c., p. 93.

1842. *Astarte globosa*, id., l.c., p. 93.
1842. *A. multicostata* Macgillivray. Moll. Aberdeen, pp. 211 and 261.
1843. *Crassina montagui* Hanley. Rec. Shells, p. 89.
1843. *C. banksii*, id., l.c., p. 350, pl. xiv., f. 37.
1843. *C. striata*, id., l.c., p. 350, pl. xiv., f. 38.
1845. *Astarte multicostata* Philippi. Abbild., vol. ii., p. 59.
1845. *A. pulchella* Jonas. Philippi, l.c., p. 60, pl. i., f. 12.
1846. *A. Warhami* Hancock. Annals Mag. Nat. Hist., vol. xviii., p. 336, pl. v., f. 15—16.
1848. *A. striata* Middendorff. Mal. Ross., vol. iii., p. 46.
1853. *A. compressa* Forbes and Hanley. Brit. Moll., vol. i., p. 464, pl. xxx., f. 1—3.
1854. *A. banksii* Sowerby (non Leach) = *striata* Leach. Thes. Con., vol. ii., p. 781, pl. clxvii., f. 8.
1854. *A. compressa* Montagu. Sowerby, l.c., p. 782, pl. clxvii., f. 6 and 7.
1855. *A. globosa* Reeve. Belcher's Last Arctic Voy., p. 398, pl. xxxiii., f. 6a—b.
1858. *A. compressa* Adams. Genera, vol. ii., p. 484.
1858. *A. Banksii*, id., l.c.
1863. *A. compressa* Jeffreys. Brit. Con., vol. ii., p. 315; vol. v., pl. xxxvii., f. 3—4.
1866. *A. striata* Leach. Packard, Mem. Bost. Soc. Nat. Hist., vol. i., p. 278.
1872. *A. compressa* Meyer and Möbius. Fauna Kieler Bucht, vol. ii., p. 99, f. 8—10.
1872. *A. banksii* Dawson. Notes Post-Pliocene Geol. Canada, pl. vii., f. 1.
1872. *A. Laurentiana*, id., l.c., f. 2, and f. 8 on cut iv.
1874. *A. abbreviata* Sowerby. Con. Ic., vol. xix., f. 6.
1874. *A. compressa* Sowerby. Con. Ic., vol. xix., f. 2a—b.

1874. *Astarte Banksii* Sow. (non Leach), id., l.c., f. 7.
 1875. *A. (Nicania) striata* Mörch. Arctic Manual, p. 132.
 1875. *A. banksii*, id., l.c.
 1877. *A. warehami* Smith. Annals Nat. Hist., vol. xx., p. 114.
 1877. *A. warehami* Jeffreys. Annals, Sept., vol. xx., p. 234.
 1877. *A. striata* Leach. Smith, Ann. Mag. Nat. Hist., Aug.,
 vol. xx., 1877, p. 143.
 1878. *Nicania Banksii* Sars. Norg. Arkt. Fauna, p. 51.

HABITAT.—Spitzbergen, Greenland, east coast of North America, Faroe Islands, Norway, Siberia, Franz Joseph Land, Baltic, North Britain and west coast of Davis Straits.

This species is excessively variable in form and sculpture, and in the words of Dr. Gwyn Jeffreys—"if a specimen of the smooth, flat and triangular form were placed side by side with the fine ribbed, convex and rounded variety *globosa* it would be difficult to imagine that they were the same species."

The variety *striata* Leach, from West Greenland, is generally fairly distinguishable by its more transverse and less triangular shape than the normal British and north European specimens. The variety *globosa* Möller, also originally described from Greenland, is scarcely separable from the *striata*, the extra roundness of the outline being but very slight and the greater thickness of little account. The *banksii* Leach, was founded on a specimen brought home by Captain Ross from off the south of Spitzbergen. These are remarkable on account of their very triangular shape and the very smooth surface, the fine ridges being replaced by mere concentric striæ. *A. uddevallensis* of J. Smith, and *A. propinqua* of Landsborough, are said by Jeffreys to be synonymous with this species. The variety *warehami* has the umbones nearly "central," is of a pale-greenish-yellow, attains a breadth of nearly an inch, and has as many as "sixty fine, close, sharp, regular concentric ribs." Hancock's figure however,

conveys a very wrong impression in this respect, for the number there represented is not more than half. I cannot believe this to be the same as *A. fabula*, as suggested by Jeffreys, for its different form and character and much greater regularity of the ribs appear to me to offer very good distinguishing characters. It is chiefly distinguished from the variety *striata* by its superior size, the paleness of its epidermis, and the regularity and greater coarseness of the ridges. Hancock's shell is stated to have a breadth of nearly an inch and a length of three-quarters, whilst the largest specimen in the museum, which considerably exceeds the average size of var. *striata*, of *compressa* is only just over two-thirds long and a little more than five-sixths in diameter. Since writing the above I have seen a typical specimen in Dr. Jeffreys' collection, which he received from Hancock. An examination of this convinces me of the opinion above expressed, namely, that it is a large fine-grown form most nearly approximating to the variety *striata*, but differing in those respects which I have already pointed out.

It is absolutely necessary to reject this name (*compressa*) if we admit that *Venus compressa* of Linné also be an *Astarte*. As various authors appear to hold different views respecting this question, some, *e.g.*, Mörch and Sars, upholding the Linnean name and rejecting Montagu's and others, such as Hanley, Jeffreys and Gould, entertaining precisely the reverse opinion; and considering the fact that Montagu carelessly employed a name already occupied, and that he confuses two species in his description and figures, perhaps it may be advisable to employ the name *montagui*, which Dillwyn, the first to recognise Montagu's error, substituted for the *compressa* of that author. However as I have disregarded the *compressa* of Linné, I have employed Montagu's name for this species by which it has hitherto been generally known.

The shell described by Linné in 1778 as *Venus compressa*

(Mantissa, p. 546) cannot be identified with absolute certainty. The characters will equally apply to more than one species of Astartidæ or Veneridæ. Neither color, locality or size are mentioned. Sylvanus Hanley appears to have first suggested the possibility of its being a species of *Astarte*. In his valuable work on the shells of Linnæus (p. 454) he observes—"The unillustrated description is applicable to more than one shell, and amongst others to a nearly mature specimen of *Astarte elliptica*." This determination has subsequently been adopted by Jeffreys, Packard, Mörch and Sars. On the other hand Dr. Edward Roemer* considers that Linné's description is more applicable to the *Venus scalarina* of Lamarck, of which the Linnean expression ("Anus linearis, subexcisis, *vulvæ simillimus*") is certainly more descriptive than of the *Astarte* referred to. Considering this divergence of opinion and the uncertainty that will ever prevail regarding the determination of the shell Linné had before him, it appears to me that his *Venus compressa* should be rejected as undeterminable.

15.—ASTARTE COMPACTA CARPENTER.

1863. **A. (? compressa, var.) compacta**, id. Suppl. Rep.
Moll. W. Coast N. America, p. 602, 642 and 682.

1865. **A. (? compressa, var.) compacta** Carpenter. Proc.
Bost. Soc. Nat. Hist., p. 57.
Phil. Acad. Nat. Sci.

HABITAT.—Puget Sound. Washington, U.S.

This species is said to be like *compressa* Mont., but compact, less transverse, with fewer concentric liræ, almost obsolete posteriorly: umbones very prominent and more acute; dorsal margins straight, at an angle of 100°; lunule less impressed,

* Kritische Untersuchung der Arten des Molluskengeschlechts *Venus* bei Linné und Gmelin, p. 84, Cassel, 8vo., 1858.

longer; ligamental area less angulated; anterior lateral tooth in the right valve more prominent. Long. .4, lat. .33, div. .21.

16.—ASTARTE LONGIROSTRA D'ORBIGNY.

1847. **A. longirostra** D'Orb. Voy. Amér. Merid., vol. v., p. 576, pl. lxxxiii., f. 21—4.
 1854. **A. longirostra** Gray. Cat. Coll. d'Orbigny in Brit. Mus., p. 70.
 1859. **Crassina longirostra** Chenu. Man. de Conch., vol. ii., f. 617.
 1872. **C. longirostra** Tryon. Proc. Acad. Nat. Sci. Philad., 1872, p. 247.

HABITAT.—Isles Malouines (Falkland Isles).

17.—ASTARTE MAGELLANICA SMITH.

1881. **A. magellanica** Smith. Proc. Zool. Soc., 1881, p. 41, pl. v., f. 7.

HABITAT.—Straits of Magellan.

This species is smaller than the preceding, of a paler colour, more coarsely ribbed, with much less acuminate and anteriorly inclined beaks, and the inner margin of the valves is crenulated, a feature not yet noticed in *longirostra*.

18.—ASTARTE TRIANGULARIS MONTAGU.

1803. **Mactra triangularis** Montagu. Test. Brit., vol. i, p. 99, pl. iii., f. 5.
 1803. **M. minutissima**, id., l.c., Suppl., p. 37.
 1807. **M. triangularis** Maton and Rackett. Linn. Trans., vol. vii., p. 72.
 1817. **M. triangularis** Dillwyn. Cat., vol. i., p. 143.
 1817. **M. minutissima**, id., l.c., p. 143.
 1819. **M. triangularis** Turton. Conch. Dict., p. 82.

1819. *Mactra minutissima*, id., l.c., p. 83.
 1822. *Goodalia triangularis*, id. Conch. Ins. Brit., p. 77,
 pl. vi., f. 14.
 1822. *G. minutissima*, id., l.c., pl. vi., f. 15.
 1825. *Crassina triangularis* Gray. Ann. Phil., vol. ix., p. 136.
 1825. *C. minutissima*, id., l.c.
 1827. *Mactrina triangularis* Brown. Illust., ed. 1, pl. xvi.
 f. 25; ed. 2, p. 108, pl. xl., f. 25.
 1828. *Goodalia triangularis* Fleming. Brit. An., p. 429.
 1843. *G. triangularis* Macgil. Moll. Aberd., pp. 218 and 289.
 1843. *G. minutissima*, id., l.c., pp. 218 and 290.
 1853. *Astarte triangularis* Forbes and Hanley. Brit. Moll.,
 vol. i., p. 467, pl. xxx., f. 4—5.
 1854. *A. triangularis* Sowerby. Thes. Con., vol. ii., p. 782,
 pl. clxvii., f. 9.
 1858. *A. triangularis* Adams. Genera, vol. ii., p. 484.
 1863. *A. triangularis* Jeffreys. Brit. Conch., vol. ii., p. 318;
 vol. v., p. 183, pl. xxxvii., f. 5.
 1874. *A. triangularis* Sowerby. Con. Icon., vol. xix., f. 16.

HABITAT.—Great Britain, South of Spain, and Canary Is.

19.—ASTARTE TRIQUETRA CONRAD.

1846. Proc. Ac. Nat. Sci. Philad., vol. iii., p. 24, pl. i., f. 6.

“Very small, triangular, elevated, equilateral and symmetrical, ventricose, polished, white, sometimes brown or purple on the disk in form of a broad ray.” Length $\frac{1}{8}$ inch.

LOCALITY.—Tampa Bay, Florida.

From Conrad’s diagnosis, quoted above, it appears that this species approaches closely *A. triangularis*, but not having seen a specimen I am unable to say whether or not it really belongs to the genus.

20.—ASTARTE PUSILLA FORBES.

1844. *A. pusilla* Forbes. Report Brit. Assoc. Advance. Sci., 1843, p. 192.

1881. *A. pusilla* Forbes. Jeffreys, P.Z.S., p. 713, pl. lxi., f. 10.

"A: testa minuta, triangulari, concentrice striata, margine, interno denticulato. Long. $0\frac{1}{12}$ " (Forbes).

HABITAT.—Naxos, Ægean Sea.

21.—ASTARTE MACANDREWII sp. nov.

Shell minute, obliquely triangularly ovate, inequilateral, whitish or brownish white, finely concentrically striated, with here and there at intervals a more conspicuous stria as if marking a period of growth. Anterior slope longer and much less curved than the posterior, very oblique. Hinder dorsal margin considerably arcuate, forming a broad curved posterior end in conjunction with the ventral outline, considerably broader than the opposite anterior end. Lunule none. Interior of valves serrated at the margins, the denticles (about twenty-three in number altogether) being coarser at the middle of the ventral edge than at the sides. Hinge composed of a single central strong cardinal tooth in the right valve and two in the left, the former falling, when the valves are closed, between the latter. The anterior or straightest slope of the right valve is grooved within the margin for the reception of the corresponding raised front edge of the opposite valve, and the posterior or ligamental slope of the latter is grooved to receive the corresponding hinder prominent edge of the right valve.

Length $1\frac{2}{3}$ mill., width from end to end also $1\frac{2}{3}$ mill.

HABITAT.—Canary Islands (MacAndrew).

This species I believe to be distinct from *A. triangularis*, under which name it appears in the list of shells dredged at the Canary Islands by Mr. MacAndrew (Annals and Mag. Nat. Hist., 1852, vol. x., p. 103).

It is smaller, less equilateral and consequently of a more oblique form, and both the anterior and posterior ends are rounder. The hinder dorsal slope is more arcuate, and the crenations within the margin are fewer. It is a smaller shell than *A. parvula* of Searles Wood, with less acute beaks, the posterior end is more rounded, and the edges of the valves are strongly crenate; whilst of *A. parvula* the author states that the margin in all the specimens "is free from the least appearance of crenulations, as well in those which are the largest and presumed to be full grown, as in the smaller and consequently younger." The *A. pusilla* of Forbes, is unknown to me and past all identification from the inadequacy of the description.

22.—ASTARTE PARVA SEARLES WOOD.

1840. Ann. Mag. Nat. Hist., p. 249.

1853. Mong. Crag. Moll., p. 192, pl. xvii., f. 12a—b.

1870. Jeffreys, Ann. Mag. Nat. Hist., vol. vi., p. 71.

HABITAT.—Sutton, Coralline Crag (S. Wood); Mediterranean, 50—100 fathoms (Jeffreys).

"Hitherto known only as a tertiary species" (Jeffreys). I have not had an opportunity of closely examining Mediterranean specimens with those from the crag, and cannot therefore give an opinion respecting their identity.

23.—ASTARTE MIRABILIS DALL.

1872. *Rictocyma mirabilis* Dall. Amer. Jour. Conch., vol. vii., p. 151, pl. xiv., f. 6.

1874. *Rhectocyma mirabilis* Martens. Zool. Record, 1872, p. 170.

HABITAT.—North Harbour, Unga Island, of the Shumagin Group, south of Alaska, in 8 fathoms, muddy bottom (Dall).

This and the two following species, which were unknown to

Dall, are closely allied and indeed may prove to be identical on comparison.

24.—ASTARTE ESQUIMALTI BAIRD.

1863. *Crassatella esquimalti* Baird. Proc. Zool. Soc., p. 70.
 1864. *Astarte esquimalti* Carpenter. Suppl. Rep. Moll. W. N. Amer., p. 642.
 1872. *Crassatella esquimalti* Tryon. Proc. Acad. Nat. Sci. Philad., p. 250.

HABITAT.—Esquimalti Harbour, Vancouver Is. (J. K. Lord).

The single shell described by Dr. Baird as a *Crassatella* is without doubt a species of *Astarte*, for its dentition and external ligament are in conformity with that genus. It is possibly only a young specimen, but the peculiar undulation of the concentric ribs (the feature of the subgenus *Rictocyma*) especially near the beaks, marks its specific distinctness. The inner edge of the valves is smooth, but it is quite likely that in the mature shell it may be crenulated.

25.—ASTARTE FLUCTUATA CARPENTER.

= *Crassatellites* sp.

1864. ? *A. fluctuata* Cpr. Suppl. Rep. Moll. W. coast N. Amer., pp. 611 and 642.
 1866. *A. fluctuata* Cpr. Proc. Calif. Acad. Nat. Sci., vol. iii., p. 209.
 1870. *A. fluctuata* Cpr. Moll. West. North Amer., pp. 97 & 128.
 1872. *A. fluctuata* Tryon. Proc. Acad. Nat. Sci. Philad., p. 246.

HABITAT.—Catalina Island, California, 30—40 fathoms.

This species was described from "dead right valves," and judging from the description it appears to be less triangular than *A. esquimalti*.

Subgenus GONILIA.

26.—ASTARTE BIPARTITA PHILIPPI.

1836. *Lucina* ? *bipartita* Phil. Enum. Moll. Sicil., vol. i.,
p. 32, pl. iii., f. 21*a*—*c*; vol. ii., p. 25.
1844. *Astarte bipartita* Philippi. Zeitschr. Malakol., vol. i.,
p. 100.
1845. *A. bipartita* Philippi. Abbild., vol. ii., p. 60, pl. i., f. 9.
1872. *A. (Gonilia) bipartita* Tryon. Proc. Acad. Nat. Sci.
Philad., p. 248.
1881. *A. bipartita* Jeffreys. P.Z.S., p. 713.

HABITAT.—Sicily (Philippi) ; Gulf of Tunis (McAndrew).

ASTARTE (WOODIA) DIGITARIA Linné.

Since writing the above, I find in a recent paper upon the mollusca of the "Lightning" and "Porcupine" expeditions, that Dr. Gwyn Jeffreys refers the *Tellina digitaria* Linné (*Lucina digitalis* of Lamarck) to the genus *Astarte*, and in this location I fully concur, but whether it be advisable to retain it in the subgenus *Woodia* of Deshayes is a matter of individual opinion. Perhaps if the section *Gonilia* be maintained on account of the peculiarity of its sculpture, we must, to be consistent, also retain *Woodia* for the same reason. Figures of this species will be found in Philippi's Enum. Moll. Sicil., pl. iii., f. 19; Delessert's Recueil, pl. vi., f. 10*a*, *b*, *c*; Reeve's Con. Icon. (*Lucina*) f. 65; Jeffreys' Brit. Con., vol. v., pl. c., f. 6.

Planorbis complanatus monst. sinistrorsum.—In the beginning of last June, I was fortunate enough to take at Wye, in Kent, a fine reversed specimen of *Planorbis complanatus*.—(Miss) F. M. HELE, Bristol, Aug. 1881.

Limnæa truncatula var. albida at Folkestone.—It may interest some of your readers to hear that I have found near here *L. truncatula var. albida* in the *minor* form. Unfortunately the locality is injured if not quite destroyed.—(Mrs.) J. Fitzgerald, Folkestone.

A FEW REMARKS ON THE SPECIES OF *ASTARTE*.

By J. GWYN JEFFREYS, LL.D., F.R.S.

The last number of the 'Journal of Conchology' contains an elaborate and conscientious review of the recent species of *Astarte* by Mr. Edgar A. Smith.

I would not have said any more about it, but for his criticism of my views on the subject; because, although I am fully aware that I must have made many mistakes in the course of a long study of the mollusca of the European seas, I do not admit the charges of having been "certainly erroneous" (as Mr. Smith phrases it) in the case of certain species.

In the last number of the Proceedings of the Zoological Society (7th June, 1881) will be found at pages 711—713 my account of the species of *Astarte* which were procured in the Expeditions of H.M.SS. 'Lightning' and 'Porcupine'. It gives the geographical and geological range of distribution and the principal synonyms.

With respect to *Astarte sulcata* I said that this is a most polymorphous and puzzling species, as regards shape, sculpture and other characters. Two of the most noteworthy varieties are *Tellina fusca* of Poli=*Venus incrassata*, Brocchi, and *Crassina elliptica* of Brown; the former has a southern, and the latter a northern habitat. The crenulation of the inner margin is by no means indicative of full growth. *Venus gallina* and many other species of that genus possess the same character in all stages of growth.

I consider *A. crenata*, Gray the same species as *A. depressa*, Brown, *A. crebricostata*, Forbes, *A. crebrilirata*, S. Wood (young), *A. Richardsoni*, Reeve, and *A. lens*, Stimpson. And I remarked that this species 'may be known by its depressed and triangular shape and its numerous ribs; but I have specimens which seem to unite it with *A. sulcata*. The typical form is smaller,

inclined to oblong, and more convex. Variable to some extent. Of two fossil valves from Bridlington of the same size, one is plain-edged, and the other has the inner margin notched.'

I would refer your readers to that paper as to other species.

My observations were founded on the examination and comparison of many hundred specimens from various parts of the Atlantic and Mediterranean seas, as well as from tertiary and post-tertiary formations.

Until an International Court has been established to decide the long mooted question of not only what is a species, but also what are the limits of so-called species, it is useless to do more than argue it. Every naturalist has a perfect right to his own opinion; and time will be the only test of such opinions being correct or erroneous



DESCRIPTION OF A NEW SPECIES OF THE GENUS *CONUS*.

By G. B. SOWERBY, junr.

Conus Brazieri.

Shell cylindrical, rather solid, transversely striated, whitish, tinged with pale rose pink, encircled with two broad bands, of a light yellowish brown, sprinkled here and there, with a few very minute brown spots; spire conical, rather short, conspicuously marked with dark brown blotches, which crossing the angle of the last whorl, are almost black; whorls elevated into a ridge against the suture, then slightly concave, with a single very faint spiral thread ridge; last whorl distinctly but not sharply angled at the upper part, convex below the angle, then nearly straight or very slightly convex. Aperture narrow above and rather wide towards the base. Lip moderately sinuated at the upper extremity.

Length 75 mill., greatest diameter (about 10 mill. below the

angle) 32 mill., greatest width of aperture (about 18 mill. from base) 10 mill.

Hab. Solomon Islands (Brazier).

The faint coloring of the body of the shell is relieved by a remarkably handsome spire, forming quite a startling contrast.

The specimen sent to me by Mr. J. Brazier (now in the fine collection of Mr. J. Cosmo Melvill) which is one of the only three he has seen, is in fine condition. Mr. Brazier took it for a var. of *Conus circumcissus* Born, but it is evidently distinct from that species. It is somewhat nearer to *C. aurisiacus*, but differs from that species in form and proportions, as well as in the absence of the markings on the body whorl.



BIBLIOGRAPHY.

Manual of Conchology, structural and systematic, with illustrations of the species.—Parts x,—xii.

By GEORGE W. TRYON, JUNR.

The family Fusidæ commenced in Part ix is concluded in Part x. Fifty-five species of doubtful or spurious Fusidæ are enumerated. The genus *Afer* is retained but with doubt and another species is placed in it *Fusus Blossvillei* Desh., from the Asiatic seas.

The genus *Clavella* is retained with one species only, and that with some hesitation. Three species are removed—*C. avelana* Reeve is a *Cronia*; *C. distorta* Reeve is one of the *Pisaniinæ*; and *C. subrostrata* Gray belong to the *Melongeniniæ*.

Buccinofusus of which *Boreofusus* Sars is a synonym, has two species.

The sub-family *Ptychatractinæ* embraces the genera *Meyeria* Dunker and Metzger and *Ptychatractus* Stimpson, the former containing one and the latter three species.

The sub-family *Fasciolariinæ* has the genus *Fasciolaria*, with fourteen recognised species, but under these are placed as synonyms many species formerly considered distinct. Five specific names are mentioned of doubtful or unidentified *Fasciolariæ*.

The sub-family *Peristerniinæ* contains the genera *Peristernia* with 30 species, *Latirus* with 34 species, *Leucozonia* with 5 species and *Lagena* with 3.

The family *Buccinidæ* embraces the sub-families *Melongeninæ*, *Neptuniinæ*, *Pisaniinæ*, *Buccininæ*, *Eburninæ* and *Photinæ*.

These parts contain 64 plates, illustrating the shell, opercula and dentition of the different species. The xii part contains also a very full index to the genera, species and synonyms mentioned in the third volume.

Les Mollusques Marins du Rousillon. Descriptions et synonymie. (The Marine Mollusca of Rousillon, France, with descriptions and synonymy). — By MM. E. Bucquoy and Ph. Dautzenberg.

This work is intended to be a complete account of the marine mollusca of the Mediterranean coast at Rousillon, which part of France is exceptionally rich in this department.

It is intended to give a diagnosis of each species, with full indications of habitat, distribution and geological origin, and to complete the work in 8 or 10 parts which will be charged to subscribers at 4 francs each, payable on the publication of each part.

The text will be accompanied by Photographic plates most beautifully executed, five of which will accompany each part, and a specimen plate accompanies the prospectus.

The first part will be published about Feb. 15th, 1882, and will contain the genera *Murex*, *Ranella*, *Pisania*, *Triton*, *Cancellaria*, *Fusus*, *Euthria* and *Hadriania*.

The moderate price at which this work is issued renders it desirable that all subscriptions should be sent direct, by Postal order or any other convenient way to M. DAUTZENBERG, 213, Rue de l'Universite, Paris; or to M. Ad. DOLLFUS, Redacteur de la Feuille des Jeunes Naturalistes, 55, Rue Pierre-Charron, Paris.

On the Mollusca procured during the 'Lightning' and 'Porcupine' Expeditions, 1868—1870,—By John Gwyn Jeffreys, LL.D., F.R.S., F.G.S., &c. Pro. Zool. Soc., April, 1878.

These cruises were made under the auspices of the Royal Society, in the North Atlantic, and in the Mediterranean Sea. Eight dredgings were made in the 'Lightning' expedition, and about 100 in the two cruises of the 'Porcupine.'

Twenty-two species of Brachiopoda are enumerated of which four are described as new—*Terebratulula tuberata* (Pl. xxii, f. 2) in North Atlantic in 795 fathoms. *T. trigona* (Pl. xxii, f. 3) off the coast of Portugal in 500 fathoms. *T. subquadrata* (Pl. xxii, f. 4) off the coast of Portugal in 500—600 fms. *Rhynchonella sicula* Seguenza MS., (Pl. xxii, f. 5, 6) English Channel in 690 fms.

A very elaborate series of tables are given showing the stations at which dredgings were made, with the temperature, and the depth in fathoms.

A table is also given of the European species of the group, giving the range of each species in depth, and also the localities where they are found fossil.

Dr. Jeffreys also expresses the opinion that *Waldheimia* and *Terebratulina* should not be considered distinct genera as Mr. Davidson has suggested.

LIST OF SHELLS COLLECTED AT BURLINGTON,
BEMPTON, SPEETON AND FLAMBRO' HEAD, YORKS.

By J. S. GIBBONS, M.B.

- Succinea putris*. Speeton.
Hyalina alliaria. Bempton.
H. cellaria. Bempton.
H. crystallina. Speeton.
Helix aspersa. Bempton.
H. hortensis. Bempton.
H. ericetorum. Speeton Road : one place only.
H. caperata. Bempton.
H. virgata. Speeton Road : with *ericetorum*.
H. cantiana. Bempton.
H. rufescens. Bempton.
H. hispida. Bempton.
Buliminus obscurus. Speeton.
Zua lubrica. Speeton.
Pupa umbilicata. Speeton.
V. pygmæa. Speeton.
Carychium minimum. Speeton.
Limnæa palustris. Burlington.
L. palustris var. *elongata*. Burlington : good var.
L. peregra var. Burlington.
Ancylus fluviatilis. Speeton.
Planorbis corneus. Burlington.
P. marginatus. Burlington.
P. contortus. Burlington.
P. spirorbis. Speeton.
Bythinia tentaculata. Burlington.
Sphærium corneum var. *nucleus*. Burlington.

NOTE ON THE ANATOMY OF *HELIX HISPIDA* AND
H. CANTIANA.

BY CHARLES ASHFORD.

In his History of the Land and Freshwater Mollusca of France, M. Moquin-Tandon describes *H. hispida* as having only a single dart-sac ("unê bourse à dard," ii., 225). On examining a series of our English examples of this species, I find it is furnished (invariably in mature individuals) with two of these organs. These are placed, one on each side of the common generative passage; each is bi-lobed—the inner lobes being the highest in position—and each contains one dart which occupies the outer lobe. Though the organ is small it is unmistakably apparent under a lens, and the form of the contained weapons makes their extraction rather easy. I have never failed to obtain two darts from an adult animal, and the form of the sac appears to be constant. It may be interesting to note that this arrangement of a double bi-lobed dart pouch occurs also in the allied species, *H. rufescens*, and (according to the author above quoted) in *H. plebeia* and *H. villosa*.

H. Cantiana. The same author departs from his usual accuracy in describing that organ which is called by different authors "the fimbriated prostate," "vesicula multifida" or "les vésicules muqueuses." In his anatomical observations upon the species he says—"vésicules muqueuses nulles." Our English representatives of *H. Cantiana* certainly possess the organ fairly developed. There are two vesiculæ, each with three to five branches (normally four, resulting from two repeated bifurcations). These are slender, vermiform and slightly azure, attaining in the mature state a length of from 5 to 7 mm. It is easier to suppose the learned author made an error in transcribing his notes, than

that the *H. Cantiana* of the continent really differs in so marked a degree from the species to which we assign that name. The organ in question is notoriously inconstant, even among individuals of the same species, in length, colour, turgidity, and especially in the number and arrangement of the branches, but when it occurs in a species, it is very rarely indeed absent from an individual of that species.

(Since the above was written I have had an opportunity of examining Adolf Schmidt's "Geschl. der Stylomm." His figure of *H. Cantiana* Mont. under Dupuy's name *H. Galloprovincialis* represents the vesiculæ multifidæ as I have described them; and his figure of the organs of *H. hispida* corroborate what I have said as to the double dart-sac.)



Note on *Bulimus Goodallii*, Miller.—This West-Indian species is not confined to the nursery grounds at Clifton and Weybridge. For many years past it has flourished in the Orchid houses of Mr. Day of Tottenham, from which locality I have procured specimens. At present *B. Goodallii* has no claim whatever to a place in the British list, but as it is gradually gaining a footing and may possibly at some future time become fairly naturalised, I add this contribution to its early history.—C. Ashford.

***Limnæa palustris* var. *albida*.**—For the last four years, I have found at Sandwich the variety *albida*—*tinctoria* form—of this species, and in company with them the white variety of *Limnæa truncatula* but not so plentifully.—(Mrs) J. Fitzgerald, Folkestone.

A white variety of *Succinea elegans*, Risso.—A short time ago, I found three specimens of a white variety of *Succinea elegans*. I have not heard of it before and it appears to be new to Jeffreys.—J. D. Butterell, Beverley.

LIFE HISTORIES OF BRITISH *HELICES*.

By JOHN W. TAYLOR.

I have been induced, by the hope that it might be useful to many conchologists, to commence a series of articles upon our British Helices. On naming my scheme to the scientific friends likely to assist, I was encouraged thereto, and have to thank for any special merit there may be in these papers, the valuable co-operation of, especially Mr. Ashford, Mr. Butterell, Miss Hele, Mr. W. Nelson, Mr. Ponsonby and other friends. To the first named gentleman I am greatly indebted, more particularly for his researches into the darts of the different species, a branch of the subject greatly neglected in this country. Mr. Butterell has kindly prepared and sent me slides of carefully mounted jaws and linguals of the desired species and communicated a number of interesting facts.

As hinted above, it is my intention to follow with other *Helices*, until the whole of our native species have been treated of. I purpose taking *H. aspersa* as my next subject, to be followed by *H. hortensis*, and I would solicit earnestly the co-operation of all conchologists to render these papers as full and accurate as possible.

It will be seen that the subject has been treated under a number of different headings; this is done designedly, so as more effectually to show, not so much our knowledge, as its deficiency, and to serve as a guide to the particular directions in which additional information will be most useful.

Mr. W. Nelson, of Leeds, is engaged upon Life histories of the *Limnæidæ*, and will be grateful for any information on the group, especially upon *Limnæa glabra* Muller, which he purposes

publishing in our next issue. It is desirable that other students should take up other genera, and publish 'life histories' of the species composing them; co-operation in this way will be cordially welcomed.

HELIX (ARIANTA) ARBUSTORUM L.

Classification.

This species is now generally placed by systematists in the sub-genus *Arianta* of Leach, a group possessing the following characters—

Shell perforate, conic or depressed globose, whorls 5—6, the last gradually descending, lunately rounded, peristome broadly labiate, its margins parallel, the basal dilated often covering the umbilicus, epiphragm membranaceous.

This species is remarkable as being an outlying member of a group having its development on the Pacific coast of N. America, where its congeners appear in a number of fine species. I am not aware of any species of this group being known in America east of the Rocky Mountains.

It has at various times and by various authors been placed under the following generic or subgeneric groups:—

Helicogena by Ferussac, *Cryptomphalus* by Charpentier, *Cochlea* by Lister and Da Costa, *Cingulifera* by Held, *Arianta* by Leach, and *Campylæa* by Frauenfeld.

Synonymy.

Cochlea maculata Lister. Hist. Anim. Angl. p. 119, pl. 2, f. 4, 1678.

Helix arbustorum L. Syst. Nat., 10th ed., p. 771, 1758.

Cochlea unifasciata Da Costa. Test. Brit., p. 75, pl. xvii., f. 6, 1778.

Helix turgidula Wood. Index. Test. Suppl., pl. vii., f. 6, 1828.

Arianta arbustorum Leach. Brit. Moll., p. 86, 1833.

- Helix Canigonensis* Boubée. Bull. Hist. Nat., p. 36, 1833.
H. Xatartii Farines. Ann. Sc. Nat., vol. ii., p. 122, 1834.
H. alpestris Ziegler. Rossm. Icon. L. & S. Moll., part 5, 1834.
H. Wittmannii Zawadsky. Rossm. Icon. L. & S. Moll., p. 5,
 f. 279d, 1837.
Cingulifera arbustorum Held. Isis, p. 911, 1837.
Helix planospira Gras. Descr. Moll. de l'Isere, p. 36, pl. iii.,
 f. 11, 1840.
H. æthiops Bielz. Verh. u. Mitth. d. Siebenb. Ver., iv., 1853.
H. (Arianta) arbustorum Moq-Tand. Hist. Moll., vol. ii.,
 p. 123, pl. xi., f. 1—4, 1855.
H. (Campylæa) styriaca Frauenfeld. Verh. zool. bot.-Ges. Wien,
 xviii, p. 149, 1868.

The foregoing synonymy is given mainly on the authority of Reeve. *Helix gothica* of L., regarded by Reeve as referable to this species, is thought by Dr. Jeffreys to be more likely to be *H. rotundata* Müll. *H. styriaca* Frauenfeld and *H. æthiops* Bielz, are considered to belong to this species on the authority of Dr. Kobelt of Frankfort.

Development, &c.

The eggs, which are about 3 mill. in diameter, are enclosed within an opaque and yellowish envelope, which probably has crystals of lime dispersed through its membranes, as in some other species. They are deposited from July to September, and vary in number from 30 to 50. They hatch in 15 to 20 days, and are adult at the commencement or middle of second year (Moq.-Tandon).

Miss F. M. Hele of Bristol, to whom I am under great obligations for her great kindness and willingness to assist in these papers, modifies and supplements the foregoing, and says: "The eggs are deposited in clusters of from 50 to 80 under the

leaves of the Coltsfoot (*Tussilago farfara*) and Dock (*Rumex vulgaris*)."

Young shells have a thin lip with a slight white internal rib.

It is stated by authors that many *Helices* retire in summer and place their heads and the mouths of their shells downwards in the earth when the increase of the shell takes place. I am not aware if this is the case with the present species.

We have no information as to the length of its life, but should suppose that it may sometimes attain an age of 5 or 6 years.


Animal.

The BODY is usually of a dark grey, or almost black above, but varies to lavender, dark brown, grey brown, umber, sienna, and occasionally to a delicate fawn. The underside varies from a light slate color to pale yellowish grey. The color of the body does not appear to have any apparent relation to the color of the shell—light colored bodies have sometimes dark fuscous shells and vice versa.

MANTLE marked with a few indistinct white specks; tentacles slender, widely divergent, with globular bulbs, and eyes a little above their tips; lower pair widely separated and swollen at tips, about one-third the length of upper pair; foot narrow and slightly keeled at tail with the sides transversely grooved.

The JAW of this species is described by Moquin-Tandon as 2.66 mill. broad, with 4 remote, narrow, parallel ribs, the two middle ones rather prominent, sometimes at the centre there is a fifth slightly visible. In old individuals there are sometimes six ribs. In the specimens I examined which were kindly furnished me by Mr. Butterell of Beverley,—who is a skilful microscopist, and ever willing to give his valuable aid to all desiring it—it is of a somewhat crescentic form with blunt ends, bearing four distinct and prominent ribs, denticulate on both margins, especially the concave one, there are also indications of three other ribs. It is composed of indurated or hardened mucus, and is of a horn color, the minute sculpture is formed of longitudinal, wavy lines which follow the exterior outline, and straight transverse lines parallel with the ribs.*

*Since writing the above, Mr. Butterell has sent 3 other jaws of this species, which differ so much from the ordinary form that I have figured them.

The LINGUAL RIBBON is long and narrow, the teeth being arranged in rows, something after the fashion of a printer's brace  but with the central point not so acute.

The formula in the specimen examined by me was—

$$36-1-36 = 10,220$$

$$140$$
The central tooth has a base of attachment much longer than broad, with concave lower margin, and has a single large median cusp, with a small undeveloped one at either side. The lateral teeth are of similar type to the central, but are deficient of the inner angle of the base of attachment, the outer laterals have a side cusp, and cutting point, the transition from laterals is shown by the greater proportional development of the cutting point, which becomes bifid, and lesser development of the cusp. The marginals have the reflection larger than the base of attachment, the reflection is produced into two lobes, the inner one bearing two cutting points, and the outer a short conical one. The outermost rows are simple spikes.

DART-SAC single, clavate, slender, livid blue in adults. Outer sac, grey, semitransparent, tough; inner sheath dark brown showing through the outer and giving it its lead-colored appearance. The sac is embraced by the two stout, subulate simple arms of the mucous glands. These are somewhat stiff, livid brown, and about 21 mill. long. The only other British *Helices* resembling it in this respect are *Helix lapicida* and *H. Pisana*.

DART. Shaft curved, slender, cylindrical, white, calcareous, more or less perforated longitudinally, expanding rather abruptly at about two thirds from the base into a broad, lanceolate, sharply pointed head, lenticular in transverse section. Base infundibuliform not connected by a contracted neck. Length 5 mm.

The word 'dart', giving as it does the idea of free transit through the air, is I apprehend a misnomer, as applied to this organ. The manner in which it is attached to its sheath, renders such an action unlikely if not impossible. I believe it to be merely exerted and then plunged or pressed forwards; when it has punctured the skin of the other snail it is frequently torn away from its sheath-attachment and remains pendant by its point (Ashford).

OTOLITHS rather more than one-hundred (Moq.-Tan.).

Shell.

SHELL, globular, somewhat compressed beneath, brownish horny, freckled with opaque yellowish or reddish markings, with a single brown band encircling each whorl, about its upper third; strongly and irregularly ridged in the lines of growth, and finely striate in a spiral direction; epidermis rather thin; whorls 5—6, convex, the last occupying three-fifths of the shell; spire generally depressed and blunt; suture rather deep; mouth forming about two-thirds of a circle; outer lip, thick, white and reflected, sometimes strengthened by a slight internal rib, much inflected above and rounded beneath; inner lip, a mere film; umbilicus small and oblique, nearly concealed by a fold of the outer lip. Diam. maj. 24, min. 20, alt. 16.

EPIPHRAGM very thin and transparent, sometimes iridescent. The respiratory orifice is near the upper part and nearly close to the outer wall, and is strengthened by a deposit of carbonate of lime.

Variations.

The differences in form, color, size, substance and texture of this species has caused authors at different times to differentiate a number of the most striking variations. Opinions differ widely as to the range of variation of this species, some of our analytical conchologists regarding as different species the forms considered as varietal only by those taking broader views.

Var. **major** Pfr. Shell larger. Diam. maj. 30, min. 27, alt. 20 mill. (=var. *depressa* Scholtz).

I have included under this head the var. *depressa* of Scholtz, which only appears different in being a very little smaller.

Dr. Jeffreys says 'not very uncommon'. Mr. C. Ashford has found it on the Castle Holmes at Scarbro' and Mr. Blackburn at Knaresbro'. Pfeiffer records it from Monte Monchsberg, Salzburg, and I have found it on the shores of Lake Lucerne in Switzerland.

Var. **septentrionalis** Clessin. Shell medium size, spire depressed, thin, umbilicated. Diam. 19, alt. 14—15 mill.

Inhabits Medalpad, Sweden.*

Var. **minima** Pfr. Shell solid, yellowish, somewhat unicolored, umbilicated. Diam. maj. 14, min. 13, alt. 10 mill.

Pfeiffer records this variety from Mount Glockner in Carinthia, at an elevation of about 8600 ft. above the sea. I am not aware of this form having been noticed in this country.

Var. **alpestris** Ziegl. Shell half the usual size, spire more raised. Diam. maj. 18, min. 15, alt. 12 mill. (= *Helix subalpina* Hartm. in sched.—var. *alpicola* Moq-Tand.—var. *minor* Pfr. and—var. *alpina*).

Found numerously on the marshes by the side of the River Lea, Hoddesden, Herts; Mr. W. Nelson has found it on the warp lands near Goole; Mr. Roebuck on the slopes of Ingleboro'. It is recorded from Knottingley by Mr. J. Wilcock; from Scarbro'—as var. *alpina*—by Mr. Gilliver; from Knaresbro' by Mr. Blackburn; and from near Banbury by Mr. Pidgeon. Mr. Ponsonby says it is found also at Buxton.

In Scotland it occurs, but rarely, in several parts of Perthshire and Aberdeenshire (F. B. White, 1873). Five years subsequently he found it abundantly at Glen Tilt, Perthshire, but confined strictly to the limestone. Mr. H. Coates found it rather common on the banks of Craigeour Burn, Perthshire.

Moquin-Tandon records it from the Jura and the Alps, and I have found it at the summit of the Gemmi pass at an altitude of about 7300 ft., and on the Righi, Switzerland.

Var. **conoidea** Westerlund. Shell large, conical, irregularly striate, with transverse somewhat confluent pale yellow markings, subperforate. Diam. 24, alt. 26 mill.

A specimen at Castle Howard, and a few by the city walls, York (Christy). Found also in Sweden.

Var. **calcareo** Högborg. Shell thick, solid, dull chesnut color, marked with yellow, mouth dull purple. Diam. 24, alt. 18 mill.

Pfeiffer does not give any indication of locality. Not known as British as yet.

Var. **rudis** Muhlfeldt. Shell small, spire depressed, marked with transverse somewhat confluent yellow lines, epidermis rugosely-plicate. Diam. maj. 21, min. 18, alt. 14 mill.

Tyrolese Alps (Pfeiffer). Not found in England.

Var. **styriaca** Frauenfeld. Shell moderately umbilicated, much depressed, fuscous-horny, with markings and radiating lines of pale yellowish, the central band dark fuscous. Diam. maj. 25, min. 22, alt. 12 mill.

Inhabits Styria. Not found in this country.

Referred to the subgenus *Campylæa* when first described.

Var. **æthiops** Bielz. Shell depressed, thin, translucent, blackish-chesnut, unicolor, narrowly umbilicated. Diam. maj. 18, min. 15, alt. 9 mill.

Found on the mountains of Transylvania, at an altitude of 6000—7000 feet. Not found in this country.

Dr. Martens says it is found on soils deficient of limestone.

Var. **fusca** Férussac. Shell brown, depressed, very thin and semitransparent. (= *H. picca* Ziegl.—*H. Wittmannii* Zawadsky.—var. *tenuissima* Pfr.)

Found at Lunna, East Zetland, where there is no limestone or other calcareous rock (Jeffer.); Scilly Isles (Miss F. M. Hele). Miss Jessie Hele has found at Carlisle some specimens which she thinks are this form, but larger than usual; she has also received 'very transparent' specimens from York.

Moquin-Tandon records this var. from Mont Dore, and the Upper Vosges, France; Pfeiffer from granitic mountains in Carinthia; Dr. Kobelt from the Black Forest; and I have taken it from the slopes of the Brevent, at Chamouni, Switzerland.

Var. **Repellini** Charpentier. Shell flatter, thin, pale and semitransparent. (= *H. planospira* Gras).

Near Grenoble, France (Moquin-Tandon). Not yet found in this country.

Var. **Canigonensis** Boubée. Shell more depressed, very thin and transparent, slightly banded or unicolor. (= *H. xatartii* Farines).

Costa Bona, near the the sources of the Tech river, Pyrenées Orientales (Dupuy). Spain (Ponsonby). Not known to inhabit this country.

It may be remarked here that M. Fagot considers *H. canigonsensis* and *H. xatartii* to be distinct from *arbustorum*, and from each other.

Var. **Baylei** Lecoq. Shell much smaller, conoid, extremely thin and transparent, clear uniform greenish yellow.

On Mont Dore, France (Moquin-Tandon). Mr. Ponsonby informs me that he has received 'an extraordinarily thin variety' from Silesia; it may possibly be this form, known hitherto from France only. Not yet discovered in this country.

Var. **marmorata** Taylor. Shell similar to typical form, but destitute of band.

Found at Castleford, Ferrybridge, and Airton, Yorkshire. I have also found it at Frutigen, Switzerland.

Var. **flavescens** Moquin-Tandon. Shell yellow or whitish-yellow, without band. (= *morbosa-albina* Westerlund).

Dr. Jeffreys says "not very uncommon". This variety generally lives in company with the typical shell and is not segregated. It is found in Yorkshire at Scarbro', Knaresbro', Pontefract, Brough, Goole, Airton, Brayton near Selby, Hessle and Worton, and at Dringhouses and Bishopthorpe near York. In other counties, it is recorded from Kent; from Westmoreland; from Oxon, at Banbury; from Stechford, Staffordshire; Whitlingham, Norfolk; Peterboro', Northamptonshire; Whittlesey, Cambridge-shire; and Mr. Nelson has collected it at Hartington, Bakewell and Dovedale in Derbyshire.

In Scotland, Dr. White has found it near the sea in Fife.

In Ireland, Mr. Thompson collected a few at Larne, Co. Antrim.

I have found it in Switzerland, at Lausanne, Interlaken and Frutigen; Moquin-Tandon quotes it from France; and it is given for Sweden by Westerlund under *morbosa-albina*.

"The epidermis appears to be more tender than that of its darker brethren, for it is more frequently corroded or effaced, and after death it is more quickly deciduous (Ashford).

Var. **pallida** (Backhouse MS.) Taylor. Shell yellow or whitish-yellow, with band.

This form has been separated from *flavescens* by Mr. Backhouse of York. It is found at York and Bell Busk, and Mrs. Fitzgerald has collected it at Folkestone.

Var. **albinos** Moquin-Tandon. (=var. *albida* Rimmer). Shell white.

Near Settle (Smith); Gargrave (J. Whitwham). Outside the city walls near the Railway Station, York, *H. arbustorum* was very abundant, and fully $\frac{1}{6}$ th of the specimens were this form (Christy). Mr. W. K. Bridgman records it as "not unfrequent near Norwich." Mr. Ponsonby informs me that it is found in Kent and in Derbyshire. Moquin-Tandon gives it in his list of French varieties.

Miss F. M. Hele says it is more common in chalky districts than elsewhere, but she does not particularize localities.

Var. **Draparnaudi** Moq.-Tand. Shell greenish brown, marked with yellow. France. Not yet recorded for this country.

Var. **Poiretia** Moq.-Tand. Brown with yellow and white markings. France. Not yet recorded for this country.

Var. **Boisseria** Moq.-Tand. Violet with white markings. France. Not yet recorded for this country.

Var. **rufescens** Moq.-Tand. Shell of a clear reddish color marked with white. France. Not yet recorded for this country.

Var. **Thomasia** Moq.-Tand. Grey with white markings. France. Not yet recorded for this country.

Monst. **sinistrorsum** Fér. Shell reversed.

Pfeiffer quotes this form, on the authority of Férussac and Hartmann but does not state locality. Not yet recorded for this country.

Pfeiffer also records scalariform specimens, on the authority of Hartmann.

A var. *maritima* is recorded in the Zoologist, March, 1853, by James Taylor, as plentiful along the coasts of Aberdeenshire and Kincardineshire, but I have been unable to find any description of it, or gain any information of its peculiarities.

Fossil.

The variety *alpestris* occurs in the upper tertiary beds of Copford, in Essex, and the type in the loëss of Fisherton Anger near Salisbury. In France it is found in the pleistocene fluvio-marine sand (sable aigre) of Menchecourt near Abbeville, and in the loëss at Frankfort and Heidelberg in Germany.

Parasites.

This species is infested with a small white mite, which does not appear to differ at first sight, from those found on other species. I obtained three individuals and placed them in a small tube, for future examination, but when I required them, I found they had all escaped through a defective place in the cork.

Habits and Habitat.

This species lives gregariously, on shrubs and on the ground; it is generally confined to a small area, and appears to travel but little from its favorite bushes. Moquin-Tandon says it is sluggish and irritable, fond of darkness, secretes mucus rather plentifully, and carries its shell inclined when crawling. It appears to prefer hedgebanks with succulent vegetation, but different observers note its preferences.

Montagu says "it delights in wet and shady places, particularly among willows and alders where the soil is black and boggy." Dr. G. R. Tate, states that it is found "on reeds by ditch sides." Dr. Jeffreys "among alders, and in moist and shady woods and hedges, and in meadows by the side of rivers." Mr. C. Ashford,

remarks "frequents hedges, especially when fringed with coarse succulent herbage, brambles, nettle beds and overgrown ditches." A number of observers concur in remarking upon its predilection for the vicinity of nettles, and Mr. Pidgeon notes its restriction to the plant *Angelica sylvestris*. Miss Hele informs me "they are found chiefly in damp places, where Ivy grows, also among nettles and coltsfoot; it thrives in captivity and it is thus easy to mature young shells, whereas *H. nemoralis* almost always die, after a few weeks captivity. Still it is a difficult species to introduce into a fresh district, I have again and again taken them from Bath, and liberated them in different hedges round Bristol, but always unsuccessfully."

Uses.

This species once occupied a place in the *Materia medica* and is enumerated by Moquin-Tandon, as one of the edible species though not much esteemed.

Food.

Miss Hele says: "I have kept them in captivity and find they will eat cabbage and lettuce, but their favorite food is the leaves of the coltsfoot (*Tussilago farfara*). They also feed on nettles."

Mr. J. C. Mansel-Pleydell states that he has met with very fine and beautifully marked specimens at Lynch Farm, Encombe, Dorset, feeding on *Heracleum sphondylium*.

Mr. C. Ashford has observed it at Scarbro' upon Wild Celery (*Apium graveolens*), but cannot affirm that it feeds upon it.

On the banks of the Cropredy Canal, Banbury, it is found amongst an abundant growth of *Angelica sylvestris*, its presence being possibly determined by the plant, as it is confined to a very small area (D. Pidgeon).

Other observers note its predilection for the vicinity of

nettles, and Mr. Thompson states that it occurs at Knockdolian, Ayrshire, with little more than Ferns (*Cystæa fragilis*) to shelter it.

Geology.

This species can accommodate itself to different elevations and to soil which yields very little calcareous matter, as granite and gneiss. The extreme form which altitude and deficiency of calcic element produces is found in the var. *Baylei* from Mont Dore, France, which is similar in texture to a *Vitrina*.

The opposite extreme would appear to be the var. *calcareæ* of Högberg, but I am without information as to the peculiarity of its habitat.

Mr. Borrer notes that it is found on bushy banks about Henfield, Sussex, and other places on the sand, and is not found on the clay. Mr. Christy has taken it in gravel pits, at Fulford, near York.

Dr. F. Buchanan White remarks that in Glen Tilt, Perthshire, "it is in profusion on the limestone slopes south of the stream, but not found at all on the gneiss to the north of it."

Of 61 Yorkshire localities, 38 are situated on limestone formations; 3 on the coal measures, but on the edge and near limestone; 17 on the post tertiary; 1 on the trias; and 2 on the drift.

"Around Bristol the shells are very dark, perhaps from the red soil, for although round Bristol Lias abounds, the Mountain Limestone at Clifton seems preferred. I have noticed that in chalky districts the white variety is more abundant, and the shells are generally of a thinner texture, and the animals lighter in color than ours here at Bristol, which are almost black" (Miss Hele).

Geographical Distribution.

Pfeiffer gives as habitats, Germany, France, England, Sweden, Podolia, Switzerland and N. Italy.

It is found in Lapland according to Von Wallenberg; Colbeau gives Belgium; Mörch, Denmark; and Miss Hele, Holland, remarking at same time that Dutch specimens "are more like British in size and color than in any other part of Europe." Mr. Ponsonby states that it is found at Munich, Bavaria; Buda-Pesth; Campiodon and other localities in Spain; Savoy; in the Brenner Pass (5000 feet); and in Norway. In Switzerland it is found at Lausanne, Frutigen, Interlaken, Ghiessbach, Fluellen, and Courmayeur, also in the Vallée d'Aoste, &c.

It is quoted by Lowe as a Madeiran shell, and by Aradas and Maggiore as Sicilian, but both these records require confirmation.

Not uncommon throughout Scotland, but rather local, frequenting damp rocks and damp shady hedge banks.

It is almost the only *Helix* that is to be found on the high mountains, where it is not uncommon, and attains an elevation of at least 3000 feet.

In the British Isles it is known to occur in the following counties:—

Locality.	Alt. in feet.	Formation.	Authority.	Remarks.
Cambridgeshire:—				
Whittlesey	Bellars	with var. <i>flavescens</i>
Cornwall	Jeffreys, Dr	
Cumberland:—				
Carlisle	Hele, Miss	near var. <i>fusca</i>
Durham:—				
Durham	Bailey	
Derbyshire...	Ponsonby	var. <i>albinos</i>
Bakewell	Nelson, W	var. <i>flavescens</i>
Buxton	Ponsonby	var. <i>alpestris</i>
Dovedale	Nelson, W	with var. <i>flavescens</i>
Hartington	Nelson, W	with var. <i>flavescens</i>
Matlock	Broadhead	
Millersdale	West	
Devonshire:—			Montagu	
Exeter...	Parfitt	rare
Dorset	Mansel	throughout
Encombe	-Pleydell	very fine

Locality.	Alt. in feet.	Formation.	Authority.	Remarks.
Essex:—				
Saffron Walden	Ashford, C	
Gloucestershire:—				
Bristol	Lias	Hele, Miss	very dark shells
Clifton	Carb. limestone	Hele, Miss	
Cooper's Hill...	Simpson, E	
Stapleton	Leipner	
Hunts:—				
Earith...	Ashford, C	
Herts:—				
Hoddesden	Jeffreys, Dr	var. <i>alpestris</i>
Hants:—				
Christchurch	Ashford, C	
Kent	Ponsonby	var. <i>albinos</i>
Charlton	Harting	
Folkestone	Fitzgerald	with var. <i>pallida</i>
Erith	Leslie	
Faversham	Fairbrass	
Sevenoaks	Smith	local, not common
Lancashire:—				
Burnley	Bailey	
Bootle, nr. L'pool...	Williams	
Hornby	Roberts, G	with a conical var.
Lincolnshire:—				
Glentham	Bothamley	
Owston Ferry	Nelson, W	
Middlesex:—				
Fulham	Harting	
Hammersmith	Harting	
Norfolk:—				
Norwich	Bridgman	common
Whitlingham	Bellars	with var. <i>flavescens</i>
Trowse	Bellars	
Northampton:—				
Peterborough	Bell	with var. <i>flavescens</i>
Eye	Bell	
Northumberland:—				
Alnwick	Bailey	
Notts:—				
Newark	Bailey	
Scawley	Lowe	rare
Thrumpton	Lowe	rare
Oxford:—				
Banbury	Pidgeon	with var. <i>flavescens</i>
Oxford	Norman	
Shropshire	Eyton	
Somerset	Ponsonby	
Bath	Hele, Miss	
Leigh Woods	Leipner	

Locality.	Alt. in feet.	Formation.	Authority	Remarks.
Staffordshire :—				
Dudley ... ..	...	...	Tye	
Stechford ... ..	...	...	Tye	with var. <i>flavescens</i>
Suffolk :—				
Sudbury ... ..	...	...	King	
Surrey ... ..	...	...	Da Costa	
Battersea ... ..	...	...	Harting	
Sussex :—				
Eastbourne ... ..	...	...	Eastb.Soc.	
Hastings ... ..	...	...	Langdon	rare
Henfield ... ..	...	...	Borror	on the sand
Landport, Lewes ... ..	...	...	Unwin	not uncommon
Ratham ... ..	...	...	Jeffery, W	local
Warwickshire :—				
Alum Rock, Birm. ... ..	...	...	Nelson, W	
Westmoreland ... ..	...	...	Dix. & Wats.	var. <i>flavescens</i>
Wight, Isle of :—				
Ventnor ... ..	...	...	Ponsonby	
Wiltshire ... ..	...	...	Montagu	
Salisbury ... ..	...	...	Blackmore	
Worcestershire :—				
Kidderminster ... ..	...	...	Nelson W	
Yorkshire :—				
Acomb	300	Post Tertiary	Christy	
Askham	300	"	Hey	
Beverley	300	"	Butterell	
Bishophthorpe	300	"	Madison	with var. <i>flavescens</i>
Brayton	300	"	Nelson, W	with var. <i>flavescens</i>
Bulwith	100	"	Grassham	
Clifton	300	"	Christy	one specimen
Driffield	300	"	Pollard	
Dringhouses	300	"	Hey	common
Fulford	300	"	Hey	In gravel pits
Goole	100	"	Nelson, W	var. <i>alpestris</i>
Hessle	100	"	Butterell	with var. <i>flavescens</i>
Hobmoor	300	"	Christy	rare
Newland	100	"	Maxwell	
Swinefleet	100	"	Maxwell	
Ulleskelf	300	"	Pollard	with var. <i>alpestris</i>
York	300	"	Christy	
Strensall	300	Trias	Christy	3 or 4 specimens
Addingham	400	Glacial drift	Nelson, W	of calcareous origin
Hackfall	300	"	Dalton	very abundant
Askern	300	Permian	Wilcock	
Barwick	400	"	Nelson, W	
Boston Spa	300	"	Beevers	
Conisbro'	300	"	Wilcock	
Ferrybridge	300	"	Nelson, W	with var. <i>marmorata</i>
Knaresbro'	300	"	Grassham	with var. <i>flavescens</i>
Knottingley	300	"	Wilcock	

Locality.	Alt. in feet.	Formation.	Authority.	Remarks.
Yorkshire :—				
Lead... ..	300	Permian	Nelson, W	
Newton nr. Castlfd.	300	"	Nelson, W	
Pontefract ...	300	"	Hepworth	with var. <i>flavescens</i>
Sherburn ...	300	"	Nelson, W	
Studley ...	400	"	Roebuck	
Tadcaster...	300	"	Crowther	
Towton	300	"	Nelson, W	
Brantingham...	300	Oolite	Butterell	
Brough ...	200	"	Butterell	with var. <i>flavescens</i>
Cayton ...	100	"	Nelson, W	
Castle Holmes ...	100	"	Ashford, C	with var. <i>flavescens</i>
Castle Howard ...	300	"	Christy	var. <i>conoides</i>
Filey ...	200	"	Bailey	
Gristhorpe ...	200	"	Bailey	
Malton ...	300	"	Butterell	
Pickering...	300	"	Whitwham	
Settrington ...	300	"	Pollard	
Speeton ...	200	"	Bailey	much eroded
Whitby ...	300	"	Pollard	
Airton ...	600	Carb. limestone	Madison	with var. <i>marmorata</i>
Bell Busk ...	600	"	Nelson, W	with var. <i>pallida</i>
Birk Rigg ...	800	"	Crowther	
Gargrave ...	400	"	Whitwham	with var. <i>albinos</i>
Gordale Scar...	900	"	Parsons, Dr	
Grassington ...	600	"	Roebuck	
Hardraw Scar	600	"	Scharff	
Hawes ...	600	"	Pollard	
Ingleton ...	800	"	Roebuck	var. <i>alpestris</i>
Settle ...	600	"	Roebuck	with var. <i>albinos</i>
Skipton ...	400	"	Nelson, W	
Worton ...	300	"	Crowther	with var. <i>flavescens</i>
Castleford ...	300	Coal measures	Nelson, W	with var. <i>marmorata</i>
Hunslet ...	300	"	Nelson, W	since died out there
Methley ...	200	"	Nelson, W	
Scilly Isles ...	...	...	Hele, Miss	var. <i>fusca</i>
Isle of Man ...	...	...	Forbes, Prof.	uncommon
<i>WALES.</i>				
Brecon :—				
Vaynor ...	...	...	Trump	
Carnarvonshire :—				
Llangefni ...	...	...	Hirst	river bank, rare
Flint :—				
Gwernymynydd ...	400	Carb. limestone	Shrubsole	abundant
<i>IRELAND.</i>				
Antrim :—				
Larne ...	...	..	Thompson	with var. <i>flavescens</i>

Locality.	Alt. in feet.	Formation.	Authority.	Remarks.
<i>IRELAND.</i>				
Cork :—				
Cork	Hincks	
Down	Thompson	
Dublin :—				
Dublin, Near to	Turton	
Kerry :—				
Killarney	Brown	

SCOTLAND.—In Scotland, I have records of its existence in ARGYLE (Alfd. Brown); AYRSHIRE, plentiful near the town of Ayr, at the foot of Doon, &c., and at Troon (McMurtrie). Mr. Alfred Brown says it occurs also at Dundonald and Largo. Mr. Thompson records it from Knockdolian and from the Falls of the Clyde. BUTESHIRE: Mr. Brown records Kamesburgh. CAITHNESS: Mr. W. Baillie of Brora, has found it rarely at Dunheath, East Caithness, and at Brawl Castle on Thurso River, Northeast Caithness. DUMBARTON: Mr. Brown gives Luss and Bowling. DUMFRIESSHIRE: Mr. Brown has taken it at Thornhill. FIFESHIRE: Dr. White records it from the coast, and Rev. J. McMurtrie says it is found at Burntisland, and he is informed it occurs at Aberdour. HADDINGTONSHIRE: abundant near North Berwick on banks facing the sea, east from the town (McMurtrie). KINCARDINESHIRE: Rev. J. McMurtrie informs me that it is plentiful near the sea at Stonehaven, and Mr. James Taylor records a variety *maritima* as plentiful along the coast. KINROSS: Mr. H. Coates informs me it is found at Rumbling Bridge Glen, on the Devonian formation. LANARKSHIRE: Mr. H. Nelson has found it near Glasgow, and Mr. Brown at Carmyle. PERTHSHIRE: Dr. White has taken it abundantly at Glen Tilt, and Mr. H. says it is found on the Devonian system at Perth at an elevation of 50—300 ft., and at Pitlochrie on the Silurian at 100—400 ft. RENFREW: Mr. Brown has found it in this county. ROSSHIRE: Mr. Ponsonby says it is found in the northwest of this county. SKYE: abundant near Portree (McMurtrie). STIRLING: Mr. Brown has collected it at Drymen and Milngavie. SUTHERLAND: quite common on the east coast, and at Assynt on the southwest, at the foot of high cliffs about 600 feet above the sea (W. Baillie).

ENGLAND.—BERKS: Mr. W. C. Atkinson has found several specimens in a wood bordering the Thames at Sonning

Lock near Reading. **BUCKS:** Mr. H. Ullyett has taken it at High Wycombe. **CHESHIRE:** Mr. G. W. Shrubsole informs me of its occurrence at Barrow near Chester, on the Trias at 150 feet elevation. **DERBYSHIRE:** Mr. E. Pickard says "rather uncommon at Heath," and Mr. W. E. Brown has found it on the Mountain Limestone at Castleton. **LANCASHIRE:** Mr. J. T. Lightwood says "it is very rare in the Fylde district, the soil is entirely sandy." **NOTTS:** Mr. E. Pickard has found it in Pleasley Vale on Magnesian Limestone. **SOMERSET:** Mr. W. E. Brown has found it at Clevedon on Mountain Limestone. **SUSSEX:** Mr. Merrifield quotes Brighton, and Mr. J. E. Harting gives South Harting in the valleys and not on the hills. **WORCESTERSHIRE:** Habberley Valley (Miss Fairbrass). **YORKS:** Mr. Roberts gives Loft-house; Mr. Nelson, Newthorpe; Mr. L. E. Emmet, nr. Sheffield; Mr. Welburn, about Sledmere; Mr. H. Richardson, Helmsley and Kirkham in woods on the Oolite, Swalwell on Carboniferous strata, and Corbridge and Stanhope; Mr. J. H. Davis says "amongst nettles in several places about Thirsk, and under Boltby Scar at an elevation of 700 feet."

Records of its occurrence in Russia, Turkey, Greece, Portugal, Peninsular Italy, and the islands of the Mediterranean Sea, are wanting.

Records are also deficient for the Channel Islands, the Hebrides and Orkneys; also for the following English, Welsh, Scotch and Irish counties:—

ENGLAND.—Bedford, Hereford, Leicester, Monmouth and Rutland.

WALES.—Anglesea, Cardigan, Carmarthen, Denbigh, Glamorgan, Merioneth, Montgomery, Pembroke and Radnor.

SCOTLAND.—Berwick, Banff, Clackmannan, Cromarty, Edinburgh, Elgin, Forfar, Inverness, Kirkcudbright, Linlithgow, Nairn, Peebles, Roxburgh, Selkirk and Wigton.

IRELAND.—Armagh, Cavan, Clare, Carlow, Donegal, Fermanagh, Galway, Kildare, Kilkenny, King's County, Leitrim, Limerick, Londonderry, Longford, Louth, Mayo, Meath, Monaghan, Roscommon, Sligo, Queen's County, Tipperary, Tyrone, Waterford, Wexford, West Meath and Wicklow.

THE MOLLUSCA OF BRISTOL AND VICINITY.

By J. W. CUNDALL.

Read before the Conchological Society.

In the annexed list are included all species and varieties that, as far as I have been able to ascertain, have ever been recorded in the district, together with their actual and reputed localities. Those I have personally observed are distinguished from those I have not yet taken in the neighbourhood by the latter being italicised, and reputed localities are similarly dealt with.

Anodonta cygnea Stapleton ; Kennet and Avon canal ; &c.,
Gloucestershire. Kenn Moor &c., Somerset.

A. cygnea var. *radiata*. Kennet and Avon Canal.

A. anatina. Kennet and Avon Canal.

A. anatina var. *radiata*. Kennet and Avon Canal.

A. anatina var. *ventricosa*. Kennet and Avon Canal.

Ancylus fluviatilis. Stapleton, Gloucestershire.

A. lacustris. Ham Green, Somerset.

Arion ater. General.

A. flavus. General.

A. hortensis. General.

Achatina acicula. Stallard's Batch ; Yatton ; *Leigh Woods* ;
Oldbury Court.

Acme lineata. *The Downs* ; *Shirehampton* ; &c.

A. lineata var. *alba*. } *Rejectamenta of the Avon per Dr. J.*

A. lineata var. *sinistrorsa*. } *Gwyn Jeffreys.*

Assiminea Grayana. *Avonmouth(?)*.

Bythinia tentaculata. General.

Bythinia tentaculata var. *ventricosa*. *Bristol*.

B. Leachii. Kenn Moor, Somerset. *The Avon*.

Bulimus acutus. Burnham ; *The Downs and Leigh Woods*,
under stones(?).

- Bulimus montanus.** Cooper's Hill; Gloucester; &c.
B. obscurus. General.
B. obscurus var. alba. St. Vincent's Rocks.
Balia perversa. Stapleton; Westbury-upon-Trym; Long Ashton;
Sea Mills.
Carychium minimum. General.
Cyclostoma elegans. General.
Clausilia rugosa. General.
C. rugosa var. Everetti. Bristol (Miller).
C. rugosa var. tumidula. Brockley Coombe.
C. Rolphii. The Cotswolds near Gloucester; Long Ashton;
buttress of the Suspension Bridge (?).
C. biplicata. The Downs; Oldbury Court; Leigh Woods (?).
C. laminata. In many places.
C. laminata var. pellucida. Leigh Woods; Stoke Bishop.
C. laminata var. albida. Leigh Woods; Brockley Coombe.
C. solida. Stapleton (Rich).
Cochlicopa tridens. Brockley Coombe, Somerset.
C. tridens var. crystallina. Brockley Combe, Somerset.
C. lubrica. In many places.
C. lubrica var. lubricoides. Bath (Clark).
Conovulus denticulatus. Banks of Avon, near Pill.
C. denticulatus var. myosotis. Banks of Avon, near Pill.
C. bidentatus. Banks of Avon, near Pill.
C. bidentatus var. alba. Banks of Avon, near Pill.
Dreissena polymorpha. The Avon; Kennet and Avon Canal;
Docks; &c.
Helix aculeata. Leigh Woods; Stapleton; Combe Dingle.
H. aculeata var. albida. Bath (Clark).
H. pomatia. The Cotswolds, near Gloucester.
H. aspersa. General.
H. aspersa var. albo-fasciata. Westbury-on-Trym.

- Helix aspersa* var. *exalbida*. Westbury-on-Trym.
H. aspersa var. *conoidea*. General in hedges.
H. nemoralis. General.
H. nemoralis var. *hortensis*. General.
H. nemoralis var. *hybrida*. Burnham; *Bitton*; &c.
H. nemoralis var. *major*. Parry's Lane.
H. nemoralis var. *minor*. Parry's Lane.
H. arbustorum. Leigh Woods.
H. cantiana. Ashley Hill; Leigh Woods; &c.
H. rufescens. General.
H. rufescens var. *albida*. Westbury-on-Trym; Leigh Woods.
H. rufescens var. *minor*. Parry's Lane; Sea Mills; &c.
H. concinna. Stoke Bishop.
H. concinna var. *albida*. The Downs.
H. concinna var. *minor*. Sea Mills; Bath (Clark).
H. hispida. General.
H. hispida var. *albida*. Ashley Downs.
H. sericea. Sea Mills; &c.
H. fusca. Combe Dingle; Stapleton; Leigh Woods; The Downs.
H. virgata. General.
H. virgata var. *submaritima*. Clevedon (McMurtrie).
H. virgata var. *subglobosa*. The Downs.
H. virgata var. *subaperta*. Bath (Clark).
H. caperata. General.
H. caperata var. *major*. Redland.
H. caperata var. *ornata*. Redland.
H. caperata var. *subscalaris*. Redland.
H. rupestris. General.
H. rupestris var. *viridescenti-alba*. St. Vincent's Rocks.
H. ericetorum. Stapleton; Ashley Hill; &c.
H. ericetorum var. *minor*. St. Vincent's Rocks.
H. rotundata. General.

- Helix rotundata* var. *Turtoni*. Bristol (Jeffreys); Bath (Clark).
H. rotundata var. *pyramidalis*. Bristol (McMurtrie).
H. rotundata var. *alba*. Clevedon (Norman).
H. pulchella. Ashley Hill; Leigh Woods; &c.
H. pulchella var. *costata*. Westbury-on-Trym.
H. pygmæa. Ashley Hill; Redland; Westbury; &c.
H. lapicida. St. Vincent's Rocks; Leigh Woods; Stapleton.
Hydrobia ventrosa. Avonmouth; Shirehampton; near Cook's Folly; &c.
Limnæa glutinosa. Stapleton.
L. peregra. General.
L. peregra var. *ovata*. Ashley Downs.
L. auricularia. River Frome; Clevedon; Keynsham; Boiling Wells; Leigh Woods; Shirehampton; Garraway's Nursery; &c.
L. auricularia var. *albida*. Bath (Clark).
L. stagnalis. Kenn Moor; Clevedon; Keynsham; Leigh Woods; Garraway's Nursery; Shirehampton; Boiling Wells.
L. stagnalis var. *labiata*. Clevedon.
L. stagnalis var. *fragilis*. River Frome; Kennet and Avon Canal.
L. stagnalis var. *sinistrorsa*. Kenn Moor (Norman).
L. palustris. Kenn Moor; Frenchay; Kennet and Avon Canal; Garraway's Nursery.
L. palustris var. *conica*. Yatton (McMurtrie).
L. palustris var. *roseo-labiata*. Clevedon.
L. involuta. Stapleton (?).
L. truncatula. Avonmouth; Westbury-on-Trym; Coombe Dingle; Horfield.
L. glabra. Redland.
Limax maximus. General.
L. marginatus. General.

Limax flavus. General.

L. agrestis. General.

Neritina fluviatilis. Stapleton.

Paludina vivipara. Kennet and Avon Canal; *Henbury*; *Ponds near Cook's Folly*; *Brislington*; *Keynsham*.

Pisidium amnicum. Stapleton.

P. fontinale. Avonmouth; *Stapleton*.

P. fontinale var. *Henslowana*. *Leigh Woods*; *Kennet and Avon Canal*.

P. fontinale var. *pallida*. *Kennet and Avon Canal*.

P. fontinale var. *cinerea*. *Kennet and Avon Canal*.

P. pusillum. Avonmouth; *Bedminster*.

P. pusillum var. **obtusalis.** Avonmouth.

P. nitidum. *Horfield*.

Physa fontinalis. Coombe Dingle; Westbury-upon-Trym; Kenn Moor, &c.

P. hypnorum. Shirehampton; *Ashton*; *Horfield*.

Planorbis nitidus. Shirehampton; Ham Green.

P. nautilus. Shirehampton; *Horfield*; *Bedminster*; Burnham.

P. albus. Frenchay; Ham Green; *The Downs*; *Westbury-upon-Trym*.

P. albus var. *Draparnaldi*. *Bristol* (J. G. Jeffreys).

P. complanatus. Shirehampton; Kenn Moor; *The Downs*.

P. spirorbis. General.

P. vortex. General.

P. carinatus. "Common" (?), *Kenn Moor*.

P. corneus. Kenn Moor; *Henbury*; *Clevedon*.

P. corneus var. **albina.** Kenn Moor; *Clevedon*.

P. contortus. Kenn Moor; *Downs*; *Ashton*; *Shirehampton*; *Stapleton*; *Clevedon*.

P. contortus var. *albida*. *Weston-super-Mare* (Rich).

Pupa secale. The Downs; Leigh Woods, &c.

Pupa secale var. *alba*. *St. Vincents Rocks*.

P. umbilicata. General.

P. umbilicata var. *alba*. *Somersetshire* (Norman).

P. umbilicata var. *edentula*. *Cotswold Hills*.

P. marginata. Leigh Woods; Sea Mills; Redland.

P. marginata var. *bigranata*. *Bath* (Clark).

P. marginata var. *albina*. *Somersetshire* (Clark).

Sphærium rivicola. Kennet and Avon Canal; Stroud Canal;
Stapleton; Keynsham.

S. cornea. Stapleton; Kenn Moor; Stoke-Gifford, &c.

S. cornea var. *flavescens*. *Clevedon; Stapleton.*

S. cornea var. *nucleus*. *Clevedon; Stapleton.*

S. cornea var. *scaldiana*. *Stapleton* (Rich).

S. cornea var. *pisidioides*. *River Avon.*

S. ovale. *Kennet and Avon Canal.*

S. lacustris. Blaise Castle; Avonmouth; Ham Green; *Clifton.*

Succinea putris. Stapleton; Stoke Gifford; Avonmouth;
Coombe Dingle, &c.

S. elegans. Stoke Gifford; Avonmouth; Westbury; *Clevedon;*
Burnham.

S. oblonga. *Burnham (?)*.

Testacella Maugei. Redland.

T. haliotideia. Redland.

Unio pictorum. Kennet and Avon Canal; River Avon;
Stapleton.

U. pictorum var. *radiata*. *River Avon.*

U. tumidus. Kennet and Avon Canal; Stapleton.

U. tumidus var. *radiata*. Kennet & Avon Canal; Stapleton.

U. tumidus var. *ovalis*. *River Avon; Bath.*

Vitрина pellucida. Blaise Castle; *The Downs.*

Valvata piscinalis. Kennet and Avon Canal; Kenn Moor;
Nailsea; Keynsham.

- Valvata cristata.** Blaise Castle; Kenn Moor.
Vertigo antivertigo. The Downs; Boiling Wells.
- V. pygmæa.** Ashley Hill; The Downs.
V. minutissima. Durdham Downs (J. G. Jeffreys).
V. angustior. Rejctamenta of River Avon (J. G. Jeffreys).
V. alpestris. Over; Gloucester; canal banks at Sharpness (Jones).
- Zonites crystallinus.** Stapleton; Leigh Woods; Blaise Castle; Redland, &c.
- Z. crystallinus var. complanata.* Leigh Woods (J. G. Jeffreys).
- Z. fulvus.** Leigh Woods; Stapleton; Horfield.
Z. fulvus var. murtoni. Somersetshire.
- Z. cellarius.** General.
- Z. cellarius var. albida.** Clifton; Redland.
- Z. alliaris.** Leigh Woods; Blaise Castle; Portishead, &c.
- Z. nitidulus.** Coombe Dingle; Leigh Woods; Blaise Castle, &c.
- Z. radiatulus.** Leigh Woods.
- Z. purus.** Leigh Woods; Coombe Dingle.
Z. purus var. margaritacea. Clifton.
- Z. nitidus.** Coombe Dingle; Bathampton; Boiling Wells.

The above list comprises 177 species and varieties, being 107 species and 70 varieties. Of these I have personally observed 91 species and 19 varieties; and with respect to several of these, their localities in the district do not appear to have been before recorded. With regard to the remaining 16 species and 51 varieties some are extremely doubtful, and the presence in the list of *Clausilia biplicata*, *Assimineæ Grayana*, *Conovulus bidentatus*, *Limnæa glutinosa* and *involuta*, *Succinea oblonga* and *Vertigo alpestris* is in all probability the result of accident or error. It will be seen that the majority of the remainder are, if rare, well authenticated, and the discovery of the others is presumably simply a matter of time.

One or two peculiarities of the districts may be worth noticing. Leigh Woods, Kenn Moor and the river Frome are each rich in specimens, and from each I have obtained shells unobtainable (so far as I have been able to ascertain) elsewhere; but on the other hand, in the majority of instances, but few species are found associated, and hence collecting is rendered laborious.

As to marine shells, but few are procurable in the vicinity. *Tellina solidula* (dead) is common among the rejectamenta of the river. *Ianthina communis* is reported to have been found in a similar situation, and Sowerby's Illustrated Index assigns to *Petricola lithophaga* a habitat at Bristol.

At Weston-super-Mare, Clevedon or Burnham, all within easy reach may be found *Cylichna obtusa*, *Tellina solidula*, *Nucula nucleus*, *Scrobicularia piperita*, *Rissoa ulvæ*, a couple of *Littorinæ* and a few other common species.

Bristol, November 26th, 1881.



Note on Gundlachia.—This seems a widely diffused genus, ranging from New York to Tasmania; I daresay it occurs in the Brazils. I have been rather sceptical about it, but not on very good grounds, but both Mr. Sanderson Smith and Mr. Guppy say that at certain times of the year the septum is absent, and at all times the majority of specimens have none. Again, I have seen a slight trace of a septum in our *Ancylus fluviatilis*, where it has been left dry at times by the stream retiring. A Mexican species of *Ancylus* found by me and referred to Mr. Guppy, was at first assigned to *Gundlachia*, but we could find no septum.—
J. S. GIBBONS, M.B., Modderfontein, Cape Colony.

FRESH WATER MUSSELS IN THE OUSE AND FOSS.

BY THE REV. W. C. HEY, M.A.

Read before the Yorkshire Philosophical Society.

The Ouse and the Foss, which unite just below York at the spot known as the Blue Bridge, are rivers of very different character, much more so than the superficial observer would suppose. The Ouse is a wide, deep, and generally rather a rapid river, sometimes, in floods, almost a torrent. The Foss is a narrow river, naturally shallow, though in parts deepened artificially, and the current flows so gently that often the water is practically stagnant. Again, the Ouse has a very bare channel somewhat hard and stony in places, and even where the bottom is soft and sandy there is no vegetable growth. But the Foss has a bottom of rich soft mud, where the flags and the water-lilies root themselves and flourish luxuriantly. In places the river is quite overgrown with tall rushes in summer time. Again, the Ouse receives a good deal of drainage, the Foss not much, except one very poisonous kind, viz., that which escapes the Gas Works. Once more, near York the Ouse has no locks. This is a very important point to notice in regard to the distribution of species. But the Foss has three locks within the space of as many miles, viz., Castle Mills Lock, Yearsley Lock, and Huntington Lock. Asking you to bear in mind these points of contrast between the Ouse and the Foss, I go on to make a few remarks on the genera and species of mussels found in these rivers. The family of *Unionidæ* or freshwater mussels is represented in England by two genera, viz., *Unio* and *Anodonta*. This is the distinction between them. In *Unio* the hinge, or point upon which the valves work, is supplied with projections known as teeth, and corresponding receptacles. In *Anodonta* the hinge-line is quite smooth and

toothless. There are three kinds of *Unio* found in England—firstly the famous pearl mussel, which is confined to mountain streams, and therefore does not occur at York; secondly, *Unio pictorum*, so-called because painters used the shell for palettes; and thirdly, *Unio tumidus*. The last two occur in both our rivers. In the genus *Anodonta*, Jeffreys makes two species, *Anatina*, in which the hinge line is carried into a sort of crest, and *Cygnæa*, which has the hinge line almost parallel with the other edge of the shell. This distinction, however, is difficult to preserve: one form passes by imperceptible grades into another. Both forms occur abundantly at York. The mussels can be collected in plenty only when the locks are open. The water then sinks sufficiently low to disclose large numbers of them sticking in the soft banks. When Naburn Lock is opened that small portion of the River Foss (only some 200 yards in length) which lies between Castle Mills Lock and the Blue Bridge is almost drained. Very near the mouth of the Foss occurs a number of mussels belonging to the species *Anodonta anatina*. They are remarkable for possessing a beautiful ornamentation of rich green rays. The epidermis is lustrous, the interior highly nacreous. Now, by walking a few yards we find ourselves following the bank of the Ouse. Here occurs the very same form of *Anodonta*, but how changed in appearance! Instead of a lustrous green epidermis, the shell is of a dark dead brown colour, the pearliness of the interior is quite dull, and the phenomenon of erosion, or the eating away of the epidermis and upper layers of the shell, is extensively developed. Erosion is caused by the presence of carbonic acid or by the rapidity of the current of water. Probably the former has caused the disfigurement of the Ouse *Anodontas*, owing to the drainage matter present in the river just below York. Exactly the same contrast is shown in the specimens of *Unio pictorum*, from the same two localities, with the additional distinc-

tion that the Ouse specimens have a slightly curved form, and belong to the variety termed *curvirostris*. Between Castle Mills Lock and Layerthorpe Bridge Anodontas are more or less abundant, but they no longer present the beautiful radiated colouring which distinguishes the Blue Bridge specimens. Drainage affects the colouring unfavourably, but in certain parts improves the size. There was, and perhaps is still, a spot where warm water was discharged into the river. At this point the shells were observed to be larger and more delicate than elsewhere, exemplifying the general effect of heat upon forms of life. At Layerthorpe Bridge shells cease to exist in the river. This is due to the poisonous matter percolating through the banks from the Gas Works. However, immediately above Monk Bridge, another species of *Unio* appears, and is more or less abundant from that spot up to Yearsley Lock. This species is *Unio tumidus*; and what is remarkable about it is that it appears in two forms—one a thick, dark brown wedge-shaped form; the other a thinner, wider, and greenish-tinted form. Why the same species should be present in two forms under exactly the same circumstances is a puzzle, for it is a generally received law that were two different forms exist under the same conditions each has a right to be elevated to the dignity of a species. And this is a law I should like rigidly to adhere to, for I conceive it to be one of the few thoroughly scientific criterions of a species. Near the bathing place in the Foss, there exists, though it is very scarce, a curious form of *Unio*, which in the "Journal of Conchology" I described as *Unio tumidus*. I now believe it to be more correctly referred to *pictorum*. The shell is large, very heavy, much truncated, and in colour a dark olive brown. Above Yearsley Lock we find a great change in the form of the toothless mussels. The form *cygnea*, in which the sides of the shell are parallel, takes the place of the crested form, which, according to my experience,

is universal in the lower reaches of the river. The colour of the shell is a clear rich olive or sepia, and the beak is much protruded. It seems strange that the locks should separate forms of shells as completely as they do, for two circumstances must be borne in mind. The first is that a good deal of water passes round by what is called the backwater, especially in flood time; and the second, that the locks were once often opened, and have not, of course, existed from a very remote time; so that we seem here to have a striking example of the readiness with which forms of life are restricted in distribution and affected in shape and colouring. The same restriction of distribution and modification of form is exemplified in the river Foss in the case of many other species of freshwater shells. Thus a particular form of *Sphærium lacustre* predominates only near Foss Islands, while another species, *Sphærium ovale*, occurs nowhere within miles of York except in the tiny space between the Castle Mills Lock and Blue Bridge, and what is still more strange, had never been found either there or anywhere else in England till within late years. Mr. Jeffreys has a theory that it was imported from America, but no communication, so far as I am aware, has ever existed between our River Foss and any vessels which have crossed the Atlantic. The coal barges of the Foss would be a sorry sort of craft in which to stem the billows which roll between England and America, and I am not aware that anything larger has in modern times floated upon its waters, nor even that any American export is ever brought up the river. A few special forms of freshwater mussels deserve notice. Just above Yearsley Lock occur some dwarfed and malformed specimens of *Unio tumidus*. This malformation I venture to attribute to the effect of the water rushing over the dam. Rapidly running water is always deleterious to the development of such shells as generally affect still waters. Near Clifton Slope occur some very thin, but bright and

clean, *Anodontas*, only small in size. They are clean, doubtless, because of the absence of drainage, and they are small and thin because, not only is drainage absent, which often affords rich food, but the river is very clear of vegetable matter. Near the Union, there occur in the Foss, shells of *Unio tumidus* much curved in form. They resemble *Unio margaritifera* in shape. It is curious that all our British *Unios* and *Anodontas* have a tendency to assume this form under certain circumstances. These investigations, made over a space of a dozen years or more suggest a few general reflections. The first reflection bears on distribution; that subject which the genius of Wallace has rendered so deeply interesting. For the fact of so temporary and incomplete an obstacle as a lock forming a boundary line between varieties, and even kinds of shells, gives us some limit about the apparently small lines of demarcation which may determine the complete range of species and even genera upon the surface of the globe. Our second reflection is upon the instability of species, and the impossibility of any cut-and-dried definition of the term. Of course a natural history which ignored species would be as absurd as a thermometer ungraduated—only species are best regarded in the same light, merely degrees marked upon the unbroken flow of life. The third reflection is how species are affected by a change of circumstances, and that, though the change is often far from being very obvious. No one would suppose that the difference in the quality of the water in the Ouse and the Foss is so great as the difference between the two forms of *Anodonta* living within a few yards of one another shows it to be. A superficial and special view of any department of natural history leads to the conclusion that Nature has, as it were, a number of moulds from which she is never tired of producing the same forms. A wider and more general view, extending to past geological epochs, reveals the great fact, that as

the individual so too the species and the genus, have their birth, their vigour, their decay, and their death, and that nature's moulds themselves are as impressionable as the receiving surface of the photograph—not one external influence but evokes a corresponding modification.

NOTE ON THE SPECIFIC DISTINCTNESS OF *HELIX* (*MESODON*) *CHILHOWEENSIS*, LEWIS.

By JOHN H. THOMSON, C.M.Z.S.

In examining some magnificent specimens of *Helix* (*Mesodon*) *chilhoweensis* Lewis, (vide Proceed. Philad. Acad. Nat. Sci. 1875, p. 335) received from and collected by Mrs. Judge Geo. Andrews, in the mountains of Tennessee, and comparing them with *Helix* (*Mesodon*) *Sayi* Binney, of which species it is supposed to be only a larger growth, by Mr. W. G. Binney, I note on the two last whorls, *revolving* striæ, decussating with the ribs of growth, which I am unable to find on any specimen of *Helix Sayi* even the var. *major*. I also note on those specimens furnished with "the faint rudimentary tooth near the umbilicus" vide l. c., that it differs materially from the tooth on the lower part of the aperture in *H. Sayi*, in fact the tooth in *H. Sayi* appears more like a *fold* with a corresponding constriction on the *outside* of the shell, forming in fact a slight superficial groove running round on the umbilicus. The description of the species by Dr. Lewis, must be somewhat amended as he says, (Proc. Philad. Acad.) "parietal wall without any indications of a tooth." In about one-half of my specimens I find a large obtuse tooth on the *parietal* wall, in fact in one specimen I found *two* teeth, one *bifid* and further within the shell on the parietal wall, but both *very* different from the parietal tooth of *Helix Sayi*. Diameter of my specimens from 35 to 41 mill.

Hab. Smoky Mountains, North Carolina, and Cumberland Mountains, Tennessee.

LIST OF SPECIES AND VARIETIES OF *SUCCINEÆ*
COLLECTED IN HUNGARY.

BY MRS. J. FITZGERALD.

In July and August of the present year—1881—I visited Buda-Pesth, for the purpose of collecting and studying the family *Succinea*. Mr. Julius Hazay, who is the present great German authority on the subject, kindly assisted me. The following is a list of the types and varieties that I was fortunate enough with his kind help to obtain.—

- Succinea putris* L.
- S. putris* var. *grandis* Hazay.
- S. putris* var. *fontana* Hazay.
- S. putris* var. *limnoidea* Picard.
- S. putris* var. *angusta* Hazay.
- S. putris* var. *Westerlundiana* Hazay.
- S. putris* var. *olivula* Baudon.
- Succinea Hungarica* Hazay.
- S. Hungarica* var. *hasta* Hazay.
- S. Hungarica* var. *cuneola* Hazay.
- Succinea elegans* Risso.
- S. elegans* var. *Piniana* Hazay.
- S. elegans* var. *longiscata* Mort.
- Succinea oblonga* Drap.
- Succinea Kobelti* Hazay.

All the *Succinea* and indeed all the water shells, near Buda-Pesth attain dimensions, gigantic in comparison with those of our own country. Mr. Hazay collects largely, and I understand will supply complete named collections from Buda-Pesth for 63/-.

THE MOLLUSCA OF BIRSTWITH, YORKSHIRE.

BY F. T. WALKER.

AQUATIC.

Sphærium corneum L. A pond at Hampsthwaite is the only locality I know of.

S. lacustre Mull. Brick-ponds near Burnt Yates; also at Ripley and Hampsthwaite. It seems to be much commoner than *corneum*.

Pisidium fontinale Drap. Brick-ponds at Burnt Yates and Hartwith Dam.

P. fontinale var. **cinerea** Alder. Found abundantly on Rennie Crag, near Birstwith.

P. pusillum Gmelin. Ditches near Ripley.

P. nitidum Jenyns. Pond at Hampsthwaite.

Unio tumidus Phil. Stream at Ripley, and a pond near the stream.

Anodonta cygnea var. **rostrata** Rossm. Stream at Ripley.

A. anatina L. Stream at Ripley.

Planorbis albus Mull. Hartwith Dam.

Limnæa peregra Mull. Very common.

L. palustris Mull. Ditches at Ripley.

L. truncatula Mull. Hartwith Dam and Ripley.

Ancylus fluviatilis Mull. Plentiful on stones in the Nidd.

TERRESTRIAL.

Arion ater L. Very common.

A. hortensis Fer. Very common in gardens, &c.

Limax flavus L. Rennie Crag.

L. agrestis L. Very common.

L. maximus L. Very common.

Vitrina pellucida Mull. Very common in damp woods, &c.

- Zonites cellarius*. Very plentiful.
- Z. alliarius*. Harrogate and other places, but not plentiful.
- Z. nitidulus*. Very common.
- Z. nitidulus* var. *nitens*.
- Z. purus*. Found in several localities, but in small numbers.
- Z. purus* var. *margaritacea*. Plentiful on a bank near Nidd Bridge.
- Z. radiatulus*. Common.
- Z. crystallinus*. Very common.
- Z. fulvus*. Found in a damp beech wood under decayed leaves.
- Helix aculeata*. Mossy bank near Birk Crag, Harrogate.
- H. aspersa*. Knaresbro', on limestone.
- H. nemoralis*. Knaresbro', Pateley Bridge and many other places; it seems to be more plentiful on limestone.
- H. nemoralis* var. *hortensis*. Very common round Birstwith on sandstone, but the species is very seldom found.
- H. arbustorum*. Very abundant at Knaresbro'. I found a broken shell on a stone heap at Birstwith, where it had been dropped by a bird.
- H. rufescens*. Very common.
- H. rufescens* var. *albida*. Knaresbro'.
- H. concinna*. Very common.
- H. hispida*. Very common.
- H. caperata*. Very common.
- H. ericetorum*. Found near Birstwith, but rare.
- H. ericetorum* var. *instabilis*. Found near Birstwith.
- H. rotundata*. Very common.
- H. rupestris*. Very abundant at Greenhow Hill near Pateley Bridge.
- H. pygmæa*. Nidd Bridge.
- H. pulchella*. Nidd Bridge and Knaresbro'.
- H. lapicida*. Eugene Aram's Cave, Knaresbro', and amongst

some nettles at Birstwith.

Bulimus obscurus. Knaresbro'.

Pupa umbilicata. Plentiful at Knaresbro' and about Greenhow Hill.

Clausilia rugosa. Common at Knaresbro' and Greenhow Hill.

C. laminata. Stean Beck near Middlesmoor.

Cochlicopa tridens. Plentiful on a bank near Nidd Bridge.

C. lubrica. Very common.

Carychium minimum. Nidd Bridge, Harrogate and other places.



Note on Testacella Maugei Fér.—I have just received from a correspondent in Somerset a living *Testacella*—presumably *Maugei*—and have been making some experiments on it. On gently pressing the head with a pencil it showed signs of irritation by forcing out a quantity of frothy mucus from the margin of the shell, on continuing to tease it, it extruded its odontophore for almost a quarter of an inch and then gradually withdrew it, this was repeated several times; I then procured a worm, thin, but about three inches long, I rubbed the worm gently across the head of the *Testacella* and the tongue was again rapidly extended and the victim transfixed, the odontophore was then withdrawn as before, carrying with it the struggling worm which made every effort to escape, but without success, in about 5 minutes all had disappeared except the head which was rejected.—J. DARKER BUTTERELL, Beverley.



A LIST OF THE SHELLS OF THE "LOWER TEES" DISTRICT, YORKSHIRE.

BY CHARLES ASHFORD.

J. W. W.=JOHN W. WATSON. C. A.=CHARLES ASHFORD.

Airyholme Wood is between the village of Ayton and Roseberry Topping.

- Sphærium corneum** L. Generally distributed in the Lower Tees district (C. A. and J. W. W.).
- S. lacustre** Mull. Pretty general in the neighbourhood Ayton and Stokesley (J. W. W.).
- Pisidium amnicum** Mull. General (J. W. W.).
- P. fontinale** var. **pulchella** Jenyns. Very general round about Ayton (J. W. W.).
- P. fontinale** var. **cinerea** Alder. In running streams near Guisborough (J. W. W.).
- P. pusillum** Gmelin. Generally distributed (J. W. W.).
- Anodonta cygnea** L. General in south of district (J. W. W.).
- Neritina fluviatilis** L. Ballast hills near Middlesbrough (J. W. W., alien?).
- Bythinia tentaculata** L. General (J. W. W.). Pond near Redcar (C. A.).
- B. Leachii** Shepp. Not nearer than Billingham Beck, S. Durham (J. W. W.).
- Valvata piscinalis** Mull. Not nearer than Billingham Beck, S. Durham (J. W. W.).
- V. cristata** Mull. Ditches near Gt. Ayton (J. W. W.).
- Planorbis nautilus** L. Near Middlesbrough (J. W. W.).
On duckweed in pond, Coatham marshes (C. A.).
- P. albus** Mull. Ditches near Gt. Ayton (J. W. W.).
- P. glaber** Jeffr. Ponds near Gt. Ayton (J. W. W.).
- P. spirorbis** Mull. General in the district (J. W. W.).

- Planorbis vortex** L. General in the district (J. W. W.).
- P. complanatus** L. General in the district (J. W. W.).
- P. contortus** L. General in the district (J. W. W.).
- Physa hypnorum** L. General in the district (J. W. W.).
Coatham marshes (C. A.). Ditch by Old Railway,
Coatham (C. A.).
- P. fontinalis** L. General in the district (J. W. W.). Ponds,
Coatham (C. A.).
- Limnæa peregra** Mull. Common everywhere (J. W. W. and
C. A.). A variety in Coatham marshes (*labiosa?*) has a
tendency to the puckered and expanded mouth of
auricularia (C. A.).
- L. stagnalis** L. Near Stockton-on-Tees (J. W. W.). "N.
Yorkshire" (D. and W.)
- L. truncatula** Mull. General in south of district (J. W. W.).
Common, Coatham marshes (C. A.).
- L. glabra** Mull. Pretty general in south of district (J. W. W.).
- Ancylus fluviatilis** Mull. General in neighbourhood, Gt. Ayton
(J. W. W.). Running stream near Redcar (C. A.).
- A. lacustris** L. General round Ayton (J. W. W.).
- Arion ater** L. Generally round Redcar (C. A.) and probably
throughout.
- A. hortensis** Fer. Redcar (C. A.).
- Limax agrestis** L. Everywhere (C. A.).
- Succinea putris** L. General in south of district (J. W. W.).
Coatham marshes and Redcar sandhills (C. A.).
- Vitрина pellucida** Mull. General in south of district (J. W. W.);
and in the north (C. A.).
- Zonites cellarius** Mull. Generally distributed, under stones,
etc. (C. A. and J. W. W.).
- Z. alliarius** Miller. Coatham Whin, Yearby Wood and Wilton
Wood (C. A.). Airyholme Wood (J. W. W.).

- Zonites nitidulus** Drap. General in south (J. W. W.). Common in north (C. A.).
- Z. purus** Ald. Coatham Whin and Yearby Wood (C. A.). General in south (J. W. W.).
- Z. purus** var. **margaritacea**. Wilton Wood (C. A.).
- Z. radiatulus** Ald. Coatham Whin (C. A.). Pastures, Gt. Ayton (J. W. W.).
- Z. crystallinus** Mull. Coatham Whin, Yearby Wood and Wilton Wood (C. A.). General in south (J. W. W.).
- Z. fulvus** Mull. Coatham Whin, Yearby Wood and Wilton Wood (C. A.). General in south (J. W. W.).
- Helix lamellata** Jeffr. Airyholme Wood (D. and W.). Wilton Wood (C. A.).
- H. aculeata** Mull. Coatham Whin and Yearby Wood (C. A.). General in south (J. W. W.).
- H. aspersa** Mull. Common throughout district.
- H. nemoralis** L. General; especially abundant on sandhills by the sea (C. A.).
- H. nemoralis** var. **hybrida** Poiret. Crathorne and Hutton Rudby (J. W. W.).
- H. rufescens** Pennant. General round Ayton (J. W. W.).
- H. concinna** Jeffr. Coatham sandbanks (J. W. W.).
- H. hispida** L. In profusion on the Redcar sandhills (C. A.). Common everywhere (J. W. W.).
- H. fusca** Mont. Airyholme Wood (J. W. W.). Wilton Wood (C. A.).
- H. virgata** Da Costa. Sandhills along coast from Warrenby to Marske, in profusion near Coatham (C. A.).
- H. caperata** Mont. Sandhills, Coatham to Marske, abundant (C. A.).
- H. caperata** var. **ornata** Picard. Coatham sandhills, not common (C. A.).

- Helix ericetorum** Mull. Coatham sandhills (C. A.).
- H. rotundata** Mull. General round Gt. Ayton and Stokesley (J. W. W.).
- H. pygmæa** Drap. General round Gt. Ayton (J. W. W.).
- H. pulchella** Mull. Widely distributed (C. A.).
- Bulimus obscurus** Mull. Airyholme Wood (J. W. W.).
- Pupa ringens** Jeffr. Airyholme Wood (J. W. W.).
- P. umbilicata** Drap. General (J. W. W.).
- P. marginata** Drap. Sandhills between Redcar Battery and Marske, extremely abundant (C. A.).
- P. marginata** var. **edentula**. Wilton Wood (C. A.).
- Vertigo antivertigo** Drap.
- V. pygmæa** Drap. Sandhills, Redcar (C. A.). Round Ayton (J. W. W.).
- V. edentula** Drap. Woods round Ayton & Stokesley (J. W. W.).
- Balia perversa** L. Airyholme Wood (J. W. W.).
- Clausilia rugosa** Drap. General (J. W. W.).
- C. laminata** Mont. Round Ayton, but not common (J. W. W.).
- Cochlicopa tridens** Pulteney. Airyholme Wood (J. W. W.).
- C. lubrica** Mull. General in north of district (C. A.). General in south of district (J. W. W.).
- Achatina acicula** Mull. Rejectamenta of Tees near Middlesbrough after a flood (J. W. W., alien?).
- Carychium minimum** Mull. Widely spread in north (C. A.). General (J. W. W.).
- Acme lineata** Drap. Airyholme Wood, once abundant (J. W. W.).



PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

 1881.

65th Meeting.

Held at the house of Mr. J. W. Taylor, Leopold Square, Leeds.
Minutes of the Annual Meeting held December 16th, 1880,
were read and confirmed.

Correspondence was read from Rev. H. Milnes, Mr. W. R. Jeffrey and Mr. W. Cash.

PAPER READ.

Mr. W. Denison Roebuck read a paper entitled "Proposed System of Conchological Locality Records."

 66th Meeting.

Held at the house of Mr. J. W. Taylor, Leopold Square, Leeds.
Minutes of the 65th Meeting were read and after some
amendment approved.

DONATIONS TO LIBRARY.

"Synopsis Molluscorum viventium testaceorum, &c."

[Dr. W. Kobelt.

"Proceedings of the Iowa Academy of Sciences."

[Prof. Finley M. Witter.

PAPER READ.

"Notes from the Isle of Wight," by Charles Ashford, Esq.

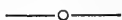
SPECIMENS EXHIBITED.

A series of Land and Fresh Water shells from Tingley near West Ardsley, and Great Preston nr. Swillington, by Mr. W. Nelson.

A number of Marine shells from Kurachee, India, collected by Mr. Kirby of Leeds; and several Land shells from Spurn Point, by Mr. W. Denison Roebuck.

The President exhibited a series of drawings of jaws of British mollusca, amongst which was *Helix arbustorum*, *H. hortensis*, *H. virgata*, *H. cantiana*, *H. rufescens*, *H. caperata*, *H. hispida*, *Succinea putris* and *S. elegans*.

A few Marine shells collected on the Yorkshire coast by Mr. Shaw, were shown by the Secretary.



67th Meeting.

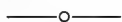
Held at the house of Mr. J. W. Taylor, Leopold Sq., Leeds.

Minutes of the 66th Meeting were read and confirmed.

Correspondence from Mr. F. M. Witter, Mr. Frederic Hepburn and the Yorkshire Naturalists' Union was read.

PAPER READ.

"*Unio luteolus* and its allied forms," by Prof. F. M. Witter.



68th Meeting.

Held at the house of Mr. J. W. Taylor, Leopold Sq., Leeds.

Minutes of the 67th Meeting were read and confirmed.

SPECIMENS EXHIBITED.

Mr. W. Denison Roebuck showed a series of Land and Fresh Water shells collected at Gisburn and Bracewell, during the Yorkshire Naturalists' Union's Meeting at Skipton. Particulars of these are entered in the Yorkshire Record Book.

DELEGATE TO YORKSHIRE NATURALISTS' UNION.

Resolved, that the President (Mr. J. W. Taylor) be re-appointed the Society's Delegate to the Yorkshire Naturalists' Union.

69th Meeting.

Held at the house of Mr. J. W. Taylor, Leopold Sq., Leeds.
Minutes of the 68th Meeting were read and confirmed.

Correspondence was read from the local Secretary of the British Association, the Secretary of Yorkshire Naturalists' Union, and Mr. Geo. S. Tye.

SPECIMENS EXHIBITED.

Mr. W. Nelson showed freshwater shells from Bramley Grange near Thorner, including *Sphaerium lacustre*, *Pisidium fontinale* and *Limnæa glabra* (found by itself in a ditch); also *Planorbis corneus* var. *albida*, from Clevedon near Bristol.

Specimens of *Helix caperata* var. *ornata*, *H. virgata*, *H. rotundata*, *H. hispida*, *H. nemoralis* and *H. cantiana*, from Knottingley; *Limnæa peregra* from Middleton, Leeds; *Zonites alliarius*, *Z. nitidulus*, *Helix rotundata* and *H. rufescens*, from Skipton; and *H. rupestris* from Cracoe, were exhibited by the Secretary (Mr. T. W. Bell). The President also showed *Helix revelata* from Guernsey, collected by Mr. J. T. Marshall.



70th Meeting.

Held at the house of Mr. J. W. Taylor, Leopold Sq., Leeds.
Minutes of the 69th Meeting were read and confirmed.

Correspondence was read from Mr. W. Jeffrey, Chichester.

NEW MEMBER.

Mr. Henry H. Haines was nominated for membership.

SPECIMENS EXHIBITED.

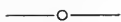
Mr. W. Jeffrey sent for exhibition a fine series of freshwater shells from Chichester and neighbourhood, amongst which were specimens of the following:—*Anodonta anatina* var. *complanata*, *Sphaerium corneum* var. *flavescens*, *S. lacustre* var. *Brochoniana*,

Pisidium fontinale, *P. æmnicum*, *P. pusillum*, *P. pusillum* var. *obtusalis*, *Limnæa auricularia* var. *ampla*, *L. peregra* var. *acuminata*, *L. truncatula*, *Planorbis nautilus* var. *cristata*, *P. spirorbis* (contorted), *P. vortex*, *P. nitidus*, *P. albus*, *P. contortus*, *Valvata piscinalis* var. *subcylindrica*, *Ancylus fluviatilis* var. *albida*, *A. lacustris* var. *albida*, &c.

Mr. Wm. Denison Roebuck showed *Limnæa peregra* and *Helix nemoralis* from Sheffield, and *Limnæa stagnalis*, *Planorbis corneus*, *P. complanatus*, *Sphærium corneum* and *Helix hispida*, from Masham.

Anodonta cygnea and *Limnæa peregra* from Roundhay Park, were shown by the Secretary.

Specimens of *Mactra glauca* from Mr. W. Cash, F.G.S., of Halifax, were exhibited and distributed amongst the members present.



71st Meeting.

Held at the house of Mr. J. W. Taylor, Leopold Sq., Leeds.
Minutes of the 70th Meeting were read and confirmed.

NEW MEMBER.

Mr. Henry H. Haines, West Ashling near Chichester, was elected a member.

SPECIMENS EXHIBITED.

Helix aspersa from Crowle, by Mr. W. D. Roebuck.

Mr. R. Scharff, Edinburgh, sent for exhibition specimens of *Limnæa peregra*, *L. truncatula*, *Helix nemoralis*, *H. caperata*, *H. rotundata*, *H. pulchella*, *Zonites alliarius*, *Z. nitidulus*, *Pupa umbilicata* and *Cochlicopa lubrica*, from Queensferry, Fifeshire. *Helix aspersa* (common), *H. nemoralis* (one dead shell, probably common), *H. intersecta* (or *caperata*, common), *H. pulchella* (common), *Zua lubrica* (a few specimens), *Hyalina* ?, and

Pupa umbilicata, from Queen's Park, Edinburgh. *Helix nemoralis* and *H. aspersa* (both very common) from North Berwick. Also *Helix aspersa*, *H. nemoralis* and *H. rotundata* from Queensferry, Fifeshire, and *Pupa umbilicata* from Aberlady, Fifeshire.

The Secretary exhibited a series of shells collected by Mr. Henry Shaw at Askern. The list included *Sphærium lacustre*, *Pisidium nitidum*, *Paludina contecta*, *Bythinia Leachii*, *Valvata piscinalis*, *Physa fontinalis* var. *curta*, *Planorbis corneus*, *P. carinatus* var. *disciformis*, *P. albus*, *Limnæa stagnalis*, *L. auricularia*, *Helix cantiana*, *Pupa umbilicata* and others, particulars of which are entered in the Yorkshire Record Book. Also *Helix fusca*, *H. concinna* and *Clausilia laminata* from Cressbrook Dale, Derbyshire; and *Clausilia rugosa* from Gourock.

BIBLIOGRAPHY.

Manual of Conchology, structural and systematic.—By Geo. W. Tryon, junr., Conservator of the Conchological Section of the Academy of Natural Sciences. Part xiii.

The fourth volume commences with the present part, which is devoted to the family Nassidæ, which here includes the genera *Northia* Gray, *Truncaria* Adams and Reeve, *Bullia* Gray, of which *Buccinanops* D'Orb., *Pseudostrombus* Klein., and *Adinus* H. & A. Adams, are subgenera; and the typical genus, *Nassa* Lam.

Some few subgenera are "retained as convenient group designations, though the species varying much in their sculpture cannot always be positively assigned." Such are the subgenera *Arcularia* Link, *Naytia* H. and A. Adams, *Alectrion* Montf., *Zeuxis* H. and A. Adams, *Acicularia* H. and A. Adams, *Phrontis* H. and A. Adams, *Hebra* H. and A. Adams, *Hima* Leach, *Niotia* H. and A. Adams, *Tritia* Risso, and *Ilyanassa* Stimpson. The

genera *Neritula* and *Desmoulea* are retained, and the following fossil genera and subgenera are retained:—*Molopophorus* Gabb, *Ptychosalpinx* Gill, *Paranassa* Conrad, and *Tritiaria* Conrad. *Leiodomus* Swainson, is considered as synonymous with *Pseudostrombus* Klein.

Fifteen plates, containing 278 figures, accompany this part, which carries us to the commencement of the genus *Neritula*.

Les Mollusques Marins du Rousillon. Descriptions et synonymie. (The Marine Mollusca of Rousillon, France, with descriptions and synonymy).—By MM. E. Bucquoy and Ph. Dautzenberg. Fascicule 1.

The first part of this beautiful work, which treats upon the genera *Murex*, *Pisania*, *Ranella*, *Triton*, *Cancellaria*, *Hadriana*, *Fusus*, *Euthria* and *Trophon*, and is accompanied by five excellent plates photographed from nature, is now before us. In addition to these purely conchological matters, there is an able article upon scientific nomenclature by M. G. F. Dollfus, a well known scientist.

Rousillon, the locality treated upon in this work, lies on the east of the department Pyrénées Orientales, and the diversified nature of the coast fully explains the great richness of the molluscan fauna.

The genus *Murex* is first considered, and 6 species are given as occurring at Rousillon. *M. Blainvillei* Payr., is referred to a new subgenus *Muricopsis* Buc. et Dautz., and *Corallinia* is also established for *M. aciculatus* Lamk. A new genus (*Hadriana*) is established for *Murex craticulatus* Brocchi.

The synonymy given under each species is very full, and the varieties known are fully particularized and often described. The geographical distribution of each species is given, and its geological position.

Contribution a la Faune Malacologique de Nossi-be et de Nossi-comba (Contribution to the Conchological Fauna of Nossi-be and Nossi-comba).—By H. Crosse, Journ. de Conch., July, 1881.

The two islands Nossi-be and Nossi-comba are situated off the west coast of Madagascar, and in this paper M. Crosse gives a resumé of the information gathered by several Naturalists who have visited the islands. Forty-two species are enumerated, of which *Ennea metula* Crosse (pl. v., f. 3), collected at Nossi-comba by M. Marie, is described as new. A new var. of *Helix omphalodes*—*Loucoubeensis* Crosse—is described, found by M. Marie in the Forest of Locoubé, Nossi-be. The var. *Hellvillensis* of *Neritina Souverbiana* is also described as new from Nossi-be. This species has a very extended range, having been recorded from New Caledonia and Port Jackson, Australia.

This interesting pamphlet is accompanied by a plate, containing figures of 6 of the more interesting species.



Dr. HARTMANN of Westchester, Pennsylvania, is now engaged upon a Bibliographical Catalogue of the genus *Achatinellinae*, a group whose species have been excessively multiplied by various authors. The able manner in which the learned Doctor has treated the genus *Partula*, and his reduction of many of the so called species to the rank of synonyms, is a good augury of the reformation he will make in the group he has now in hand.



A LIST OF THE LAND AND FRESHWATER MOLLUSCA
OBSERVED IN THE NEIGHBOURHOOD OF BEVERLEY.

BY J. D. BUTTERELL.

The following list of localities, compiled from rough notes taken during the past two or three years, must not by any means be considered an exhaustive one; as there is no doubt that by careful research and comparison of the specimens, a fair number of varieties and species may be added. Broadly speaking, the district examined is contained within a circle having a radius of five miles with the town of Beverley as its centre. The country is well wooded and numerous plantations occur. The four free pastures—Westwood, Hurn, Figham and Swinemoor, with an area of nearly 1200 acres—are good hunting grounds. Westwood is dotted over with a number of disused chalk-quarries now covered with a growth of fine old hawthorns. As habitats for the freshwater species we have the River Hull, Leven Canal three miles in length, Beverley and Barmston Drain, Leckonfield Moat surrounding the site of Leckonfield Castle, and an infinite number of ponds, drains and ditches; the latter, unfortunately for the conchologist, are kept so rigorously clean by the authorities that many species are unable to attain maturity, and some, notably *Limnæa stagnalis*, are almost extinct. Geologically, Beverley is situated on the Holderness Drift at the edge of the Chalk Wolds; the Chalk crops out at Beverley, and may be said to be the foundation on which rests the drift. The surface soil is a stiff clay and this overlies a blueish clay, both of which stretch over the whole of Holderness. A section of 50 feet made by boring for the New Alexandra Dock at Hull gives the following, and probably not much difference would be found in certain spots in the radius given.

					ft.	in.
Brown Warp	-	-	-	-	4	6
Black do.	-	-	-	-	1	0
Brown Clay	-	-	-	-	3	0
Do. Silty Warp	-	-	-	-	1	6
Dark Warp	-	-	-	-	8	6
Black Soft Warp	-	-	-	-	9	3
Black Wick Sand full of water	-	-	-	-	13	3
Black Sandy Warp	-	-	-	-	2	6
Gravel-	-	-	-	-	1	0
					<hr/>	
					44	6

Marl below this and then probably the Chalk. Bands of Peat occur, and amongst the Silty Warp in sub-fossil form are to be obtained specimens of *Mya*, *Utriculus*, *Cardium*, *Tellina*, *Hydrobia* and other estuarine shells, together with several species of Foraminifera; some are covered with serpulæ, and the epidermis of *Mya* is in some cases well preserved.

It will be observed that some usually common species are not yet recorded, and that the genera *Unio*, *Dreissena*, *Paludina*, *Balea* and *Acme* are entirely absent from the list.

AQUATIC.

Sphærium corneum Lin. Very abundant in nearly every pond, ditch and stream in the district, Figham, Long Lane, Swinemoor, River Hull, Beverley and Barmston Drain. This species is, I believe, most active at night time, and together with *Bythinia tentaculata* forms a favourite food of the Barbel.

S. corneum var. **flavescens** Macgill. Specimens of a pale yellow colour resembling this form occur in the Beverley and Barmston Drain at Figham; this variety appears to prefer streams with a sandy or gravelly bottom.

S. lacustre Mull. Local and not plentiful: small in size at Figham, in a ditch bordering the Hull Road, also in a ditch running into the River Hull at Commonbank Nook near Arram.

Pisidium amnicum Mull. Locally abundant: occurs in the Beverley and Barmston Drain near Arram, in Leven Canal and in the River Hull at Grovehill. In the last locality it is generally accompanied by *P. fontinale* var. *Henslowana* and a form which is, I believe, Baudon's *P. Henslowianum* var. *inappendiculata*, the umboes being more acute than in the typical *P. fontinale*.

P. fontinale Drap. Long Lane, Figham and Leven Canal: moderately plentiful.

P. fontinale var. **Henslowana** Shepp. Leven Canal, Barmston Drain near Arram, ditch parallel with Leven Canal, Cottingham and River Hull at Grovehill, where its scarcity or abundance appears to be determined by the action of the tides.

P. fontinale var. **cinerea** Alder. Ditch near Beverley Station: extremely abundant.

P. pusillum Gmelin. Leven Canal, ditch parallel with Leven Canal, and shallow ditch strongly impregnated with iron, on Swinemoor: extremely abundant. Specimens from the last locality are so thickly encrusted with dirt as to resemble small pellets of mud.

P. nitidum Jenyns. Ditch bordering the Hull Road, Figham, and ditch parallel with Leven Canal.

P. roseum Scholtz. Specimens determined as this species occur sparingly in a ditch in Long Lane near Beverley Minster.

Anodonta cygnea Lin. Risby Fishpond: fine specimens, but now much less numerous than formerly. Fragments of shells of this species are found on the banks of Leven Canal, and broken shells are occasionally to be seen in the fields near Cottingham, the latter probably having been carried by birds from their native habitat.

- Neritina fluviatilis** Lin. Barmston Drain: abundant in the River Hull at Grovehill, where the specimens are thickly encrusted with a calcareous deposit.
- Bythinia tentaculata** Lin. Abundant & generally distributed: Leven Canal, Figham, River Hull, Leckonfield Moat, Long Lane (fine) and Swinemoor.
- B. Leachii** Shep. Ditch parallel with Leven Canal, Figham: scarce.
- Valvata piscinalis** Mull. Leven Canal, Swinemoor, Figham and River Hull: moderately abundant.
- V. piscinalis** var. **acuminata** Jeff. In the Drift Beverley Beck and the Beverley and Barmston Drain, Figham.
- V. cristata** Mull. Leven Canal, Leckonfield Moat and Drift Beverley Beck.
- Planorbis nitidus** Mull. (not **lineatus**). Leckonfield Moat: sparingly.
- P. nautilius** Lin. Ditch bordering Swinemoor.
- P. nautilius** var. **cristata** Drap. Ditch bordering Swinemoor: with the type, abundant.
- P. albus** Mull. Leven Canal, Swinemoor and Drift Beverley Beck: moderately plentiful.
- P. spirorbis** Mull. Swinemoor, Leckonfield, Drift Beverley Beck, Long Lane and Kitchen Lane: abundant.
- P. vortex** Lin. Figham and Drift Beverley Beck: not common.
- P. carinatus** Mull. Leven Canal, Figham and Leckonfield Moat: local and not plentiful.
- P. complanatus** Lin. Everywhere common: Swinemoor, Figham, Leckonfield, Long Lane (fine), Kitchen Lane, Weel Carrs and Commonbank Nook.
- P. corneus** Lin. Swinemoor; Figham and Long Lane (fine).
- P. contortus** Lin. Swinemoor, Figham, Drift Beverley Beck, Kitchen Lane and pond near England Springs: very abundant.

Physa hypnorum Lin. Drift Beverley Beck, Cherry-tree Lane, Kitchen Lane and Commonbank Nook: not common, disappears at times.

P. fontinalis Lin. Very abundant but mostly small, the frequent cleansing of the ditches preventing its arrival at maturity. Figham, Swinemoor, Long Lane and Leckonfield Moat; from the last named locality I took one specimen with the foot bifid behind, and another in which the foot measured close upon an inch in length.

Limnæa peregra Mull. Common and abundant everywhere: fine in Leckonfield Moat and ditch in Long Lane: spire short and mouth wide at Figham and in Pighill Lane.

L. auricularia Lin. Leven Canal.

L. stagnalis Lin. Occurred formerly at Figham, but dead shells only now to be found. In Risby Fishpond very sparingly; one specimen from this locality measures two inches in length.

L. palustris Mull. Locally abundant but by no means a common species here; varies in different localities, and it is possible some of the varieties occur. Long Lane, Swinemoor, Cottingham and Pighill, where it appears to prefer mud to water and resembles *L. truncatula* in its habits, Figham. Pond in field beyond Kitchen Lane, and Commonbank Nook: abundant.

L. truncatula Mull. Swinemoor, Figham, Leckonfield Park, Kitchen Lane, and on the muddy banks of the River Hull in countless numbers, generally small.

L. glabra Mull. Plentiful in a pond near Leckonfield Moat.

Ancylus lacustris Lin. Leven Canal and Leckonfield Moat: fine and moderately abundant.

TERRESTRIAL.

- Arion ater** Lin. Generally distributed: very abundant in Pighill Lane.
- A. hortensis** Fer. Everywhere: too plentiful.
- A. flavus**. In gardens: sparingly.
- Limax agrestis** Lin. Common everywhere.
- L. lævis**. In moist places, generally distributed but not numerous: Leckonfield, Meaux, Risby and banks of River Hull.
- L. maximus** Lin. Not common: Long Lane.
- Succinea putris** Lin. Cottingham (very fine), Figham, Swine-moor, Leckonfield, Long Lane and Meaux: common.
- S. elegans** or more probably **Pfeifferi**. Generally distributed: three white shells taken in Pighill Lane in 1880.
- Vitrina pellucida** Mull. Abundant if sought for early in spring: Westwood, plantation near Rowley, and Meaux.
- Zonites cellarius** Mull. Common almost everywhere: Cherry-tree Lane (fine), Meaux, Westwood, Molescroft, and in gardens.
- Z. alliarius** Mull. Harland Rise near Cottingham, Risby (plentiful), Meaux and Molescroft.
- Z. nitidulus** Drap. Not very common: Westwood and Cherry-tree Lane.
- Z. purus** Alder. Plentiful: Harland Rise, Westwood, Meaux and Risby.
- Z. radiatulus** Alder. Risby: sparingly.
- Z. nitidus** Mull. Drift Beverley Beck and Cottingham.
- Z. crystallinus** Mull. Common: Harland Rise, Leckonfield, Drift Beverley Beck, Westwood, Meaux and Risby.
- Z. fulvus** Mull. Harland Rise, Drift Beverley Beck, Meaux (very abundant) and Risby,
- Helix aculeata** Mull. Westwood: scarce. Plantation near Long Lane: moderately common on decayed wood.

- Helix aspersa** Mull. Common: Leckonfield, Long Lane, Pighill Lane, Cherry-tree Lane, Meaux, Queensgate Road, and gardens, Beverley.
- H. nemoralis** Lin. Plentiful off the chalk: Cottingham, Leckonfield, Pighill Lane (in company with *hortensis*), Cherry-tree Lane, Meaux and Grovehill Road.
- H. hortensis** Mull. Extremely abundant in Pighill Lane, Long Lane, Queensgate Road, Cherry-tree Lane, &c. In Pighill Lane a series of specimens may sometimes be found running by fine gradations from this species to *nemoralis*.
- H. hortensis** var. *hybrida* Poirét. Pighill Lane: perhaps not quite typical but intermediate between *hortensis* and *nemoralis*.
- H. arbustorum** Lin. Very abundant in Pighill Lane, Kitchen Lane and Long Lane; found also at Queensgate Road, Leckonfield and Cherry-tree Lane: one of our commonest shells.
- H. arbustorum** var. *flavescens* Jeffreys. Queensgate Road and Long Lane.
- H. arbustorum**, bandless var., presumably *marmorata*. Occurs with the type.
- H. cantiana** Mont. Queensgate Road: abundant and fine.
- H. hispida** Lin. Common: Leckonfield, Cherry-tree Lane, Rowley, Westwood, Figham, Swinemoor, Meaux, Molescroft and Risby.
- H. hispida** var. *subrufa* Jeff. Occurs with the type.
- (**H. concinna** Jeff. I have no localities recorded as I am not sure of the type).
- H. virgata** DaCosta. Lime Quarry near Westwood, and Queensgate Road.

- Helix caperata** Mont. Lime Quarry nr. Westwood: abundant.
Pot and Ladle Chalk Pit near Walkington.
- H. caperata** var. **ornata** Picard. Lime Quarry near Westwood.
- H. ericetorum** Mull. Old quarry near the mill, Westwood.
- H. ericetorum** var. **alba** Charp. Old quarry near the mill,
Westwood.
- H. ericetorum** var. **minor** Jeff. Old quarry near the mill,
Westwood.
- H. rotundata** Mull. Harland Rise, Risby, Drift Beverley Beck,
Cherry-tree Lane, Molescroft and plantation near Long
Lane: locally abundant.
- H. pygmea** Drap. Westwood: scarce.
- H. pulchella** Mull. Drift Beverley Beck.
- H. pulchella** var. **costata** Mull. Harland Rise and Westwood:
abundant.
- Bulimus obscurus** Mull. Drift Beverley Beck.
- Pupa umbilicata** Drap. Risby: abundant. Bishop Burton,
Pot and Ladle Chalk Pit and Meaux: plentiful.
- Vertigo antivertigo** Drap. Risby: one specimen.
- V. pygmea** var. **quadridentata**. Westwood: scarce.
- V. edentula** Drap. Meaux: very abundant.
- Clausilia rugosa** Drap. Harland Rise, Rowley, Risby and
Bentley.
- C. laminata** Mont. Rowley and Harland Rise.
- Cochlicopa lubrica**. Harland Rise, Drift Beverley Beck,
Cherry-tree Lane, Westwood, Meaux, Risby and
Molescroft.
- C. lubrica** var. **lubricoides** Fer. Harland Rise.
- Achatina acicula** Mull. Harland Rise and Westwood: scarce.
- Carychium minimum** Mull. Abundant: Westwood, Risby,
Molescroft, banks of River Hull, Cottingham, &c.
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SUTHERLAND AND CAITHNESS FIELD-NOTES.

BY WILLIAM BAILLIE,
TEACHER, BRORA, SUTHERLANDSHIRE.

I had some shell hunting in the summer and autumn of 1881 over several parts of Sutherland and Caithness. *H. arbustorum* is quite common on the east coast of Sutherland, often in company with *H. hortensis* and *H. hybrida*. The ordinary form most common, the greenish-yellow and dark brown varieties, are found in Assynt, S.W. of Sutherland, at the foot of a high cliff about 600 feet above sea level. I also found a few specimens on the east coast of Caithness near Dunheath Castle and at Brawl Castle on Thurso River, N.E. Caithness. *H. aculeata*, found high up Dunheath River, Caithness. *H. ericetorum*, found in one locality on the north coast of Sutherland near mouth of Halladale River; I have a colony of them on the east coast near Brora, but lost sight of them during winter. *H. rotundata*, very common in east Sutherland and Caithness. *H. pulchella*, common on the oolite near the sea in E. Sutherland. *Vitrina pellucida*, very common in Sutherland and Caithness. *Zonites cellarius*, *alliarius*, *nitidulus*, *purus*, *crystallinus* and *fulvus* in a few localities. *Pupa umbilicata* occurs all over Sutherland and Caithness. *Balia perversa*, a few found on a beech tree near Dunrobin Castle (Duke of Sutherland's). *Clausilia rugosa* is found in considerable abundance about a ruinous castle on Loch Assynt, S.W. of Sutherland; last summer I took a colony of them to the east coast, several greenish-white in colour; it has also been found by others about Dunrobin Woods. *Cochlicopa lubrica* is very abundant near the east coast, also at Brawl Castle, Caithness; some are of a glassy appearance and a few have a white band. *Carychium minimum* is abundant in a few damp spots on the east coast oolite, particularly among rushes

and flags. *Succinea putris*, found last summer in two localities in Sutherland and one in Caithness. Besides the above I collected many fresh water shells.

In April, 1882, I found two beauties of *Helix lamellata* and one pretty large *H. aculeata*, several *Clausilia rugosa*, one *Vertigo* which looks like *minutissima*, two like *V. edentula*, one dead *Balia perversa* (which got smashed in the box on my way home) on a large beech tree—all in Golspie Burn or stream near Dunrobin Castle. I took the whole day examining one side of the stream. I found besides what seems to me a *Helix pygmæa*.

Since May, 1882, I have travelled over very near the whole county of Sutherland and two parts of Ross-shire. From Forsinard Railway Station I went north to the coast, and coasted and doubled some of the many inlets to Durness, and then down to Scourie and Unapool and crossed east from sea to sea to Invershin Station and then home by rail, taking eight days altogether. As a whole the route was poor in conchology. The east coast of the Kyle of Tongue and the west shore of Loch Assynt are the only good stations in West Sutherland, and about ten days at each station would almost exhaust the list to be found. I had not the good fortune to find *Helix rupestris*. I believe I have now one *Helix pygmæa* from Tongue Wood and another from Golspie Wood. *H. lamellata* and *aculeata* I found in two different localities in E. Sutherland. *Bulimus obscurus* I found, first alive at Rockfiel, south shore of Tarbetness, Cromarty, and lately at two localities in E. Sutherland—one near the Ord of Caithness, so I am almost sure it must extend along the east coast of Caithness. *Pupa marginata* I found lately at the roots of grass near the sea, about three miles north of Brora; I had some dead ones before, picked up at the roots of juniper bushes. Among a lot of *Pupa* collected in 1881 in E. Sutherland and kept in tin boxes all

winter, I found one *Vertigo angustior*. *V. edentula*, E. and W. Sutherland, and one near Ben Armine near the watershed. I have some beautiful varieties of *H. nemoralis* and *arbustorum*. *Pisidium pusillum* extends round the whole county east and west, and also most of Caithness; I think I have two other species of *Pisidia*. *Unio margaritifer*, Naver River in the west and Brora and Helmsdale Rivers in the east. *Valvata piscinalis*, dead shells, Loch Assynt, west. *Planorbis nautilus*, I found three living specimens about one mile south-west of Mound Station in a deep drain inclined to brackish water. *P. contortus* seems common in the lochs and rivers, often washed down to the sea-side, where I find them dead pretty often. *Limnæa peregra*, *L. truncatula* and *Ancylus fluviatilis* extend over nearly all parts of Sutherland and Caithness. I found this summer (1882) another *Limnæa* near Dornoch Firth, either half grown *palustris* or *glabra*.

CIRCE *versus* GOULDIA.

BY THE REV. R. BOOG WATSON, B.A., F.R.S.E., F.L.S., &c.

The genus *Gouldia* of C. B. Adams, had fallen into disfavour, till in the Proceedings of the Zoological Society for 1879, p. 131, Mr. W. H. Dall of the Smithsonian Institution, Washington, whom all his friends respect no less for his patriotism than for his conchology, claimed for it a new generic recognition. Mr. Edgar A. Smith in a very interesting paper published in the P. Z. S., 1881, p. 489, set aside these claims and maintained the *Circe* of Schumacher as the most satisfactory title. Mr. Dall in the Bulletin of the Museum of Comparative Zoology, Nov. 28, 1881, declined to accept Mr. Smith's verdict.

The question being, therefore, still open, I wish to point out that for *Gouldia* two positions have been claimed:—

- (i.) That of a genus, which is what its author designed for it;
- (ii.) That of a subgenus of *Circe*=*Lioconcha* Mörch.

As to i., two things have to be considered:—

- (1.) The definition of *Gouldia* as a genus by C. B. Adams;
- (2.) Its generic peculiarity at all.

As to 1, C. B. Adams based his diagnosis on two species, of which, one is unquestionably a *Crassatella* and the other is *Gouldia* (or *Circe*) *cerina*. To class two forms so diverse as these are under one diagnosis does not imply gross ignorance—nobody has charged that against Professor Adams—but it affects most seriously the value of his diagnosis. It cannot apply to both—who shall decide to which. Mr. Dall says he gives up the *Crassatella*, it is the other which is the true type. Suppose that granted (which yet after all is hardly so), then (2) is *G.* (or *C.*) *cerina* generically so? Mr. Dall thinks something may be said for it on this footing, but finally he retreats from this position and consents to its ranking as a subgenus, therefore the whole of question i. is settled: *Gouldia* cannot reckon as a genus.

We come therefore now to ii.—Is *Gouldia* to displace *Lioconcha* as a subgenus of *Circe*? In answer to that question it may probably be said that many persons will not much care whether it does or not. Subgenera are little more than museum fancies which each person treats as he chooses, but to disturb a name which has so far gained acceptance as *Lioconcha* has done, in order to make a shelter for a disembodied name like *Gouldia* is hardly wise.

On the whole therefore judgment seems to be in with Mr. E. A. Smith, and the *Gouldia* C. B. Ad. had better be abandoned.

DESCRIPTION OF A NEW SPECIES OF *ENNEA* FROM WEST AFRICA.

BY EDGAR A. SMITH, F.Z.S.,
(ZOOLOGICAL DEPARTMENT, BRITISH MUSEUM).

The species about to be described belongs to that section of the genus to which Dr. Pfeiffer gave the name *Edentulina*, on account of the absence of teeth and plicæ upon the walls of the aperture.

Ennea Martensi.

Testa perforata, ovata, mediocriter crassiuscula, cereo-albida, nitens, oblique arcuatim et confertim lirata, striis spiralibus rugulosis in interstitiis sculpta; anfractus 7, convexiusculi, ultimus supra aperturam sublævigatus et politus, postice oblique descendens, prope labrum breviter subitoque ascendens, liris longitudinalibus versus basim absoletis. Apertura lata, magna, $\frac{7}{15}$ longitudinis totius subæquans; columella obliqua, rectilinearis, nec plicata nec contorta. Peristoma album, incrassatum, undique expansum et breviter reflexum, margine labrali superne arcuato, inferne obliquo, columellari rectiusculo, subperpendiculari. Longit. 41 millim., diam. $22\frac{1}{2}$. Apertura longit. 19, latit. $15\frac{1}{2}$.

Hab.—West Africa.

This fine species of *Ennea*, forming part of the Cumingian Collection, is closely related to *E. insignis* of Pfeiffer, yet perfectly distinct. The latter species (the type of which, described in the "Proceedings of the Zoological Society" for 1856, is in the British Museum) is not perforated, has excessively fine oblique striation, has more distinct spiral sculpture than *E. Martensi* and the columella is plicate at the lower part, whilst in the present species this feature is wanting.

In the "Monatsberichte der Akademie der Wissenschaften zu Berlin" for 1876, Dr. E. von Martens has given a figure of the

animal and shell (pl. iv., f. 1) of a species which he refers to the *E. insignis* of Pfeiffer, but which appears to me to represent that above described. The form and sculpture are quite the same, the latter being very much coarser than that of *E. insignis*. Unfortunately the view given of the shell does not show the umbilical region, and consequently I am in doubt respecting that part. Another character well represented in Martens's figure is the abrupt change of sculpture from coarse liræ to a nearly smooth surface on the front of the body-whorl just above the aperture. This peculiarity is scarcely noticeable in *E. insignis*.

I take this opportunity of giving a name to a distinct species which is figured by Martens (l.c., pl. iv., f. 4—5) as the *E. monodon* of Morelet. Of this species, which I propose to name *E. Dohrni*, the British Museum possesses two specimens. It is a larger and more pupiform shell than *E. monodon*, consisting of fewer whorls and with a shorter and less conical spire. Dr. Dohrn has already pointed out its distinctness in the "Jahrbücher der Deutschen Malakozoologischen Gesellschaft" for 1878.



ADDITIONAL NOTES ON *HELIX ARBUSTORUM*.

By JOHN W. TAYLOR.

Since the publication of the "Life History" of this species additional information has come to hand, mainly through the kindly interest of Mrs. Fitzgerald, Rev. J. McMurtrie, M.A., F.L.S., Mr. W. D. Roebuck and other friends.

Distribution.

Rev. R. Boog Watson, F.L.S., informs me that according to Nordenskiöld and Nylander this species is found in Finland only in Karelen and Aland, where it is the commonest of the large

helices. Shrenck says it has been found in Hogland but this requires confirmation.

Development.

Miss Donald of Stanwix, Carlisle, informs me that this species flourishes in confinement, and that she has frequently observed immature specimens in her possession with their mouths downward in the soil, as though engaged in enlarging their shells.

Variations.

Var. *major* Pfr.

Rev. W. C. Hey reports it from Fulford Gravel Pits, and Mr. G. Roberts from Pontefract and neighbourhood.

Mrs. Fitzgerald, to whom I am under great obligations for her readiness to give information and assistance, has found it at Salzburg, Buda-Pesth, Passau and Gmunden, Salzkammergut, and has kindly given me specimens. At Salzburg some of the small bushes on the Monchsberg were literally hung with them.

Var. *minima* Pfr.

Rev. J. McMurtrie writes me that "a small form, not *alpestris*, occurs with the species at North Berwick." Mrs. Fitzgerald has kindly given me specimens of a banded form of this variety collected by her at Widgonsteg, Jura, Wurtemberg, and I have taken it near Kandersteg, Switzerland.

Var. *alpestris* Zgl.

Mr. L. E. Emmet found this var. on April 10th between Dore and Baslow near Sheffield, in company with vars. *flavescens* and *marmorata*, all hidden away half-a-foot below the surface underneath stones, sometimes in clusters of 20 together. Mr. Roberts quotes Pontefract and neighbourhood, and I have found two specimens at Bishopthorpe near York. In Scotland, Mr. H. Coates has found it at Pitlochrie on the Silurian formation at 500—600 feet elevation. Rev. J. McMurtrie says: "abundant

above Mürren," and Mrs. Fitzgerald has found it at Altdorf, Switzerland, and kindly given me specimens.

Var. **conoidea** Westerl.

Rev. W. C. Hey has a very conical form from Fulford, probably this variety.

Var. **rudis** Muhlf.

Mrs. Fitzgerald informs me she has found this in the Dolomites.

Var. **fusca** Fèr.

Carlisle (Miss Donald); Ben More, Perthshire (Hey).

Var. **Repellini** Charpentier.

Mr. Rowland has kindly sent me an interesting shell from York, which may be referred to this variety.

Var. **Moravica** Stossich.

The specimens alluded to, under var. *Baylei*, as in the possession of Mr. Ponsonby, are, Mrs. Fitzgerald informs me, this variety; and I am indebted to her kindness for specimens. I have not seen the original description.

Var. **flavescens** Moq.-Tand.

The additional localities for this variety are Beverley (Butterell), Fulford (Hey), Helmsley (Hugh Richardson), Ilkley (Nelson), Sheffield (L. E. Emmet), Skipton and Tadcaster (Miss Fairbrass); Gunnar Peak on the Tyne on nettles (Richardson); Near Carlisle (Miss Donald); Lewes, Sussex (Jenner). In Scotland, Rev. J. McMurtrie reports it "abundant near Portree, Skye; near the town of Ayr, at the foot of the Doon, &c." Mr. W. Baillie of Brora, has found it, at an altitude of 600 feet, near Assynt, S. W. Sutherland. Mrs. Fitzgerald has also kindly given me some specimens from Munich, Bavaria.

Var. *marmorata* Taylor.

This variety is reported from Beverley (Butterell), Boston Spa (J. Emmet), Castle Howard (Hey), Sledmere (Welburn) and near Sheffield (Lewis E. Emmet). Miss Fairbrass found two fine specimens on nettles at Ashford, Kent, and also has it from near Folkestone; Miss Donald finds it near Carlisle; Mr. Jenner gives Lewes, Sussex; and M. Elie Gaucher records it from Schaffhausen and Constance.

Var. *pallida* Taylor.

Mr. W. Baillie has kindly sent one not very characteristic shell from E. Sutherland, and Mrs. Fitzgerald some others from Munich.

Var. *albinos* Moq.-Tand.

Great Longton, Derbyshire (Miss Fairbrass).

"A variety with white interior at Ferry Hinksey" near Oxford is recorded by J. Dalton in *Naturalist*, 1855, p. 200.

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AUTHENTICATED LIST OF LAND & FRESHWATER
MOLLUSCA OF WESTERN SUSSEX,
WITH A FEW OBSERVATIONS ON THE DISTRIBUTION AND HABITS
OF SOME SPECIES.

BY WILLIAM JEFFERY, OF RATHAM, CHICHESTER.

(Read before the Conchological Society.)

In compiling this list my observations apply in general to the extreme west of the county, I may say almost entirely to the west of the River Arun—a district which I have worked myself within the last fifteen years. Hayling Island is in the county of Hampshire, but as my researches have extended thus far I have included it in the area.

All the species have been submitted for identification to the Conchological Society, and I am indebted also to my friend Mr. H. Haines of West Ashling for much kind assistance and co-operation during the past two years.

Some fourteen other species are recorded as found in the county of Sussex, viz.:—*Sphærium rivicola* (rejectamenta o Arun), *Bythinia Leachii*, *Planorbis carinatus*, *P. lineatus*, *Limnæa glabra*, *Helix cartusiana*, *H. concinna*, *H. sericea*?, *H. fusca*, *Pupa secale*, *Vertigo antivertigo*, *V. edentula*, *Azeca tridens* and *Acme lineata* (see Zoologist for 1878).

With the exception of *Helix fusca* none of these have come under my notice here. I found one example of this species, since having had some sent me, which I obtained near here in 1880, but am not quite certain as to the locality.

On the other hand *Limax arborum* has been overlooked by other observers, for although I find it far from uncommon and even numerous in certain parts, it is not mentioned in any of the local lists in the county of Sussex.

AQUATIC.

Sphærium corneum. Generally distributed: in the mud of ponds and ditches and occasionally amongst floating weeds. The var. **flavescens** plentiful in the mill stream at Burton near Petworth amongst and under water moss and other vegetation, but not found in the mud as is the typical *S. corneum*. They occur here literally in masses and may be taken up by the handful.

S. lacustre. In similar situations as the last and equally well distributed. Var. **Brochoniana** is found near Ratham.

Pisidium amnicum. Perhaps pretty well distributed but not numerous—not generally considered common in the

county, residing in the mud at the bottom of ditches and slow streams. The upper portion of the valves, that above the mud surface invariably incrusts.

P. fontinale. The most common and generally distributed of the genus. Last April while examining one of this species under the microscope I witnessed the birth, at intervals, of three young through the siphon. The foot of the young bivalve always appeared first, clinging round the edges as if feeling its way out, but each one was ultimately expelled by a current or rather blast of water by the parent, and was soon starting on a voyage of discovery of its own.

With regard to microscopic observations, I think I am correct in stating that I have detected in this species at the edge of the mantle at the anterior* margin (around the foot when extended) where the in-current of water

*I felt somewhat puzzled as to whether I should write anterior or posterior here. Authors do not seem to be agreed on this point. Jeffreys writes (Brit. Conch., vol. i., p. 16) with regard to the genus *Pisidium*: "beaks placed near the shorter or anterior end." But in Woodward's Manual of the Mollusca, 2nd edition, 1871, p. 462, is written: "anterior side the longest." This latter description is in my opinion correct.

In the *Pisidiadae* the foot is extended from the longer end or side, and this end is to the front when the animal is travelling with the siphon at the shorter end, behind. The same occurs in the genus *Sphaerium*, though in this case the shells are nearly equilateral. In *Unio* and *Anodonta* however the foot is protruded from the shorter end and the siphons are placed at the longer and thinner end; here therefore the shorter and thinner end would be *naturally* anterior.

I find in Popular Conchology, Catlow, 1854, in an explanation of terms: "ANTERIOR—The side of the shell, in Bivalves, where the ligament is situated," and "POSTERIOR" *vice versa*. It is probably on this ground that Jeffreys makes the assertion above alluded to, but if this be accepted as correct we must decide that *Sphaerium* and *Pisidium* travel backwards or posterior end first. Therefore I have in this case followed Woodward and written anterior.

The fact of the in-current in these genera being taken at the anterior margin, which margin would when the mollusk is under the surface of the mud be the part most deeply buried, the siphon being uppermost, tends to the inference that they derive their food from beneath the surface of the mud, or it shows that they are better adapted for a life above it than either *Unio* or *Anodonta*.

and consequently of food is situated in the genus *Pisidium*, it having no influx siphon, a fringe of vibratile cilia, whose function would appear to be to create a current for the passing away of objectionable matter while the folds of the mantle are temporarily closed, and probably being very sensitive, to detect such matter in its passage between the valves. I have most positively noticed a side current caused by these cilia or other motive power whatever it may be when the valves have been either wholly or partially closed. The influx siphon of the genus *Anodonta* and others as is well known is clothed with a very perceptible fringe, or according to Gray is bearded.

I have also remarked that the edges of the valves in *P. fontinale* are sometimes thickly fringed with a species of *Epistylus* (Protozoa), which probably find some advantage in the way of obtaining food by the current caused by the bivalve.

- P. pusillum.** In similar situations to the last named, but less frequently met with.
- P. nitidum.** I have found this species in the deep ditches and pits at Chidham. Not so generally met with as the other species in this genus.
- Unio pictorum.** Plentiful at Burton near Petworth in a tributary of the western Rother, and probably occurs in other branches of this river, which flows into the Arun.
- Anodonta cygnea.** Occurs commonly with the last named species and throughout the Arun waters. Also in the Chichester Canal.
- A. anatina.** Burton and Wisboro Green. Have taken the variety **complanata** at Burton.

Neritina fluviatilis. Last summer (1881) I found this shell plentifully in the Arun, a few miles above the town of Arundel, on chalk and stones at low water; for the tide affects the height of the river thus far. The specimens found were all of small size and more or less blackish in colour (probably from incrustation) and showing no markings, but some that I have kept living have, in a considerable portion of new growth of the shell since they were obtained, revealed the beautifully tessellated markings commonly indicated in descriptions of it.

Paludina vivipara. The only recorded locality for this shell is the River Arun (Borrer in Zoologist, 1878). I found it numerous at Wisbro' Green in 1877 in a ditch supplying the Wey and Arun Canal. It probably came from the Wey.

Bythinia tentaculata. Common in most clear streams, ponds and ditches.

Valvata piscinalis. Of frequent occurrence in such situations as the last named, but generally in deeper water. In May, 1868, I took about 350 shells from the stomach of a large eel, nearly all of which belonged to this species, but amongst them were a few *Planorbis complanatus* and one *Bythinia tentaculata*. The variety *subcylindrica* has occurred to me.

V. cristata. Amongst weeds in ponds and ditches. No doubt often overlooked from its resemblance at first sight to young specimens of *Planorbis*.

Planorbis nitidus. Fairly common. The allied species, *P. lineatus*, has not turned up in this district, though said to be found sparingly in the eastern part of the county.

P. nautilus. Found in a small pond at Chidham, without the extremely elevated ridges which occur in the variety

cristata, which var. I have found however at Ratham and also at Wisbro' Green.

Planorbis albus. Common.

P. spirorbis. Common.

P. vortex. Less common than the last.

P. complanatus. Common.

P. corneus. Have found this species in the levels of the Arun near Pulborough and Burpham, also at Bersted near Bognor, but it does not occur in the Chichester district nor west of it that I can ascertain.

P. contortus. Not so common as some other species of this genus.

Physa hypnorum. Rather a local species: frequenting stagnant ditches, which dry up in summer. This snail then buries itself in the mud at the bottom, and does not appear to turn out again when the ditches get filled in the autumn; so that its enjoyment of life must be confined to a very short period, and I have often been led to wonder how it continues to exist under such circumstances. Occasionally it may be found in slow running waters, which do not entirely dry up in summer.

It is probably the most rapid traveller of all our aquatic snails, and does not well bear the confinement of an aquarium, being almost sure to crawl out before it has been many days in one, especially if the water be allowed to attain anything beyond a cool temperature.

As one of the lung-breathers (*Pulmonobranchiata*) it has to come to the surface of the water periodically for a supply of air. When in deep water (though it naturally prefers shallow, and loves to crawl, foot upwards, on the surface) it will frequently spin a web of

slime (byssus) and so rise perpendicularly to the surface, and having taken the required supply of air, turn leisurely about and crawl down the same web again. Once while witnessing this performance, the slime parted from its mooring, when poor *hypnorum* was quickly carried to the surface again by the air which it had taken in.

Both species of *Physa* have beautifully polished shells, which of course would soon become covered with conferva, &c., if not kept off by some means. This office snails often perform for each other by rasping with their horny jaws in the usual operation of feeding, but *P. hypnorum* can effect this for itself unaided, even to the very point of its long shell, as I have had proof by observations on some I kept in an aquarium.

P. fontinalis. Generally distributed: often found in deep water.

Limnæa peregra. Common: the varieties **ovata** and **acuminata** occur.

L. auricularia. Occurs in some artificial ponds in my garden.

L. auricularia var. **ampla.** Artificial ponds in my garden.

L. stagnalis. I found this species for the first time in the Burpham brooks (levels of the Arun) last summer (1881). Mr. Harting in his "Mollusca of Sussex," Zoologist, 1878, writes that it is "common in ponds and ditches," but it certainly is not found near Chichester.

L. palustris. Common: I have obtained the variety **elongata** from Freshwater in the Isle of Wight.

L. truncatula. I think this species has a better claim to be called the 'wandering' mud shell than *L. peregra*, for wherever a roadside stream trickles down in spring it is sure to find its way, no matter to what elevation and almost equally certain to be dried up in summer.

I have lately found some small specimens in a marl pit near Woodmancote, at a considerable elevation and far from any permanent water. These were found under some of the larger pieces of loose marl, in summer, when there was no trace of water, though the position from being shaded from the sun was always damp, yet without standing water in winter.

Ancylus fluviatilis. Common in the clear running streams issuing from the chalk hills, also noted in a tributary of the Rother near Midhurst (sand district). All appear to belong to the variety **albida**.

A. lacustris. Found in a pit at Bosham and also in one at Hayling, in both places generally attached to the stems of the Cat-tail Reed (*Typha latifolia*) and of the variety **albida** in both cases.

TERRESTRIAL.

Arion ater. Common and generally distributed: brown specimens are not infrequent.

A. hortensis. Too common in our gardens and fields.

Limax marginatus. In gardens and about buildings, but not plentiful. I have found it feeding on a Great Spotted Slug which I had killed the day before.

L. flavus. Common in cellars and drains, under stones, &c.

L. agrestis. Common everywhere.

L. arborum. Not uncommon in beech plantations, where it ascends these trees, often to a great height, in showery weather, and frequently remains throughout the day in the nooks under the branches (the arm-pits as it were), but in dry weather retiring to the ground under the shelter of decaying leaves. This slug exudes a great

quantity of very watery slime on being captured. It is common among the beeches at the back of the Goodwood race stand. Has not been noticed in Sussex by other observers.

Limax maximus. Common.

Testacella has not been recorded in Sussex, but is numerous in a garden at Newport, Isle of Wight, as many as 200 having been counted in one evening.

I turned down in my garden half-a-dozen specimens sent me thence a year or more ago, but have seen nothing of them since until I found a quarter grown young one last September. It is also found in other gardens at Newport.

Succinea putris. Common and generally distributed in suitable situations. In some localities the animal is of a light yellowish colour, in others nearly black.

S. elegans. Found in Hayling Island.

Vitrina pellucida. Local but plentiful where it occurs.

Zonites cellarius. Common.

Z. alliarius. Generally distributed but not numerous.

Z. nitidulus. Fairly distributed.

Z. purus. Common, but nearly all belong to the variety **margaritacea**.

Z. radiatulus. I find this snail on my lawn at the roots of grasses, clovers, &c., in company with *Helix pulchella*; also in pastures but not plentifully.

Z. nitidus. I took some specimens of this snail near Ratham some years ago, but have not met with it recently, the ground having been drained.

Z. excavatus. Found a single specimen near Midhurst in 1881. Mr. Borrer also records a single specimen from St. Leonard's Forest (Zoologist, 1878).

Zonites crystallinus. Fairly common.

Z. fulvus. Not so common as the last but often found in company with it.

Helix aculeata. Not numerous and requires a lot of finding.

H. pomatia though plentiful in Surrey has not been found in Sussex, but *dead shells* have been discovered not far from Petersfield (Zoologist, 1878).

H. aspersa. Numerous and generally distributed; var. **grisea** occurs sparingly near the Downs.

H. nemoralis. Whether this species be distinct from *H. hortensis* or not, they are not *as a rule* found in the same localities about here. The so called black-mouth, *nemoralis*, occurs on the Downs amongst furze and juniper bushes and long grass, also in plantations on the chalk and gravel, and is a larger and stouter shell than *hortensis*. The latter is principally found in hedgerows in the level country and most commonly by roadsides, generally amongst nettles, on which it feeds greedily. I have occasionally found it ascending beech trees, but it is not generally in such cases mixed with the larger shell, *nemoralis*. Black-lipped specimens of the type *hortensis* have occurred to me in one locality, a roadside hedge about a mile below Oakwood (*nemoralis* is found in Oakwood), and it seems possible that specimens of *nemoralis* may have been carried down to this spot by floods (as there is, after heavy rains, a great flow of water from the wood by this place) and have inter-bred with the white-mouths. These black-lips are confined to the pure yellow variety without stripes.

H. arbustorum. A very local species: occurs at Harting, and I have found it on both eastern and western sides of Pulborough; also at Cocking near Midhurst. These

localities are on high and fairly dry ground. The only other locality I can record is the valley of the Ems, quite on the western border of Sussex. Here it occurs at Lordington, Racton and Westbourne, in damp situations by the stream which reaches the sea at Emsworth.

Helix cantiana. One of our commonest snails, from the Downs to the sea coast.

H. rufescens. A garden pest, and common in hedgerows.

H. hispida. Common: less hispid on marshy ground.

H. virgata. Numerous on the Downs but of small size. Fairly distributed in the lowlands to the sea coast, growing to a good size in suitable localities and in favourable seasons.

H. caperata. Generally distributed. The variety **Gigaxii** is occasionally found, and the species generally has a tendency to this form here.

H. ericetorum. Common on the Downs, generally of small size, but in some few favored spots growing to nearly $\frac{3}{4}$ -inch diameter. At Up Park for instance it is found of this size, but only, so far as I am aware, on the steep slopes of a roadway cut through the chalk, also at Adsdean Chalk-pit, again on a steep incline, and thirdly on the Downs northeast of Kingly-vale on the slopes of a cut roadway somewhat similar to the Up Park locality, with steep sides but not more than three to three-and-a-half feet deep.

It is remarkable that by neither of these roadways are any specimens to be found a yard away on the level. This fact much puzzles me.

H. rotundata. Common and generally distributed.

H. rupestris. Last summer I found this species very plentifully on a wall near Arundel. Only three other localities in Sussex are given, viz. :—Horsham and Keymer Churches

and near Lewes (Zoologist, 1878).

Helix pygmæa. Have not found this snail myself, but my friend Mr. H. Haines has given me specimens which he collected last season at Woodend near here.

H. pulchella. Equally common from the Downs to lowland meadows at the roots of herbage and under stones. I find great numbers on the lawn in my garden.

H. lapicida. Common in beech woods on the chalk; after a shower the stems of these trees are often covered with them; also about loose stone walls and ivy-covered palings. On the flat country, south of the Downs, it is rare if not altogether absent. It occurs in Hayling Island.

H. obvoluta. Distribution very restricted: occurring generally only on the northern ranges of the South Downs. Has been taken plentifully at Up Park in the extreme north-west of the county, adjoining Hampshire, and is also reported from Duneton, Graffham and Storington, further east. I have occasionally found *dead* shells for the last ten years, on a bank at Woodend, at the base of the Downs, but no living specimens, even after many careful searches during that period, so I conclude it has died out—it may have been introduced there.

Bulimus obscurus. The only representative of this genus found in Sussex, though *B. montanus* is common at Selbourne in Hants, only a few miles over the boundary. Beech woods on the chalk: common.

Pupa umbilicata. Common and generally distributed.

P. marginata. Not so numerous as the last, but occurring from the Downs to the sea.

Vertigo pygmæa. Under stones, &c., from the Downs to the lowland meadows.

Balea perversa. Common on mossy stems of beech trees and on moss-covered walls.

Clausilia rugosa. Common.

C. Rolphii. A very local species: plentiful in restricted areas about Up Park, and has been found at Racton.

C. laminata. Common in beech woods on the chalk. The variety **albida** is occasionally met with.

Cochlicopa lubrica. Common in damp situations. The var. **hyalina** is found, but not numerously.

Achatina acicula. Rare: Mr. Haines has found a few empty shells near Woodend.

Referring to this species the Rev. H. Housman in a little work recently published by him, entitled "The Story of our Museum," writes: "There was lately discovered near Chichester what appears to be an early British burying-ground. Many skeletons were found . . . The bones, which lay about three feet below the surface, were infested with *Achatina acicula*."

Carychium minimum. This minute species is no doubt often overlooked, but appears to be generally distributed in damp situations, under timber, &c., and amongst decaying leaves.

Cyclostoma elegans. Numerous on the Downs, about plantations and hedgerows extending to about $1\frac{1}{2}$ miles from the foot of the Downs on dry banks.



BIBLIOGRAPHY OF THE LAND AND FRESHWATER MOLLUSCA OF THE COUNTY OF SUSSEX.

By WILLIAM DENISON ROEBUCK.

It is proposed from time to time to issue County Bibliographies of conchological literature, and it would seem a fitting choice to commence with Sussex, on the occasion of inserting Mr. Jeffery's list of West Sussex shells. This bibliography does not by any means pretend to be complete, and the compiler would be pleased to receive additional citations for publication in the Journal. He has to acknowledge the assistance of Messrs. F. C. S. Roper, F.I.S., of Eastbourne, and W. Jeffery of Ratham, Chichester, also of the Secretary of the Eastbourne Natural History Society.

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1840. **J. E. Gray.**—"A Manual of the L. & F. W. Shells of the British Islands . . . By William Turton. . . a new edition . . . By John Edward Gray . . ."—1840.

Sussex notes at pp. 35, 37, 146, 147 and 216.

1845. **T. Vernon Wollaston.**—"Carnivorous propensity of the Helicidæ."—Zoologist, 1845, iii. 943—4.

Three *Helices* are recorded as taken at Bulverhithe.

1853. **W. H. Hawker.**—"Discovery of *Helix obvoluta* in Hampshire."—Zool., xi. 3764.

The shell is also recorded for Sussex.

1853. **W. C. Unwin.**—"A List with Notes on the Habitats and Localities, of the Land and Freshwater Molluscs, observed in the Vicinity of Lewes, in Sussex."—Morris' Naturalist, 1853, iii. 54—58.

1854. **R. H. S. Smith.**—"List of Land and Fresh-water Mollusks found near Sevenoaks, Kent."—Zool., xii. 4333.

Helix concinna mentioned for Sussex.

1858. **Dixon and Watson.**—"A Descriptive Manual of British Land and Freshwater Shells." p. 53.
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1866. **Ralph Tate.**—"A Plain and Easy Account of the Land and Freshwater Mollusks of Great Britain."
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1873. **Committee of Eastbourne Natural History Society.**—Lists of Fauna.—Published in Chambers' Handbook for Eastbourne, 1873, corrected to June, 1873. [Not seen.
1875. **Theo. Godlee.**—"Helix obvoluta Muller."—Quart. Journ. of Conch., May 1875, i. 67—68.
1875. **Theo. Godlee.**—"Helix caperata var. ornata."—Quart. Journ. Conch., May 1875, i. 70.

1875. **J. E. Harting.**—"Rambles in Search of Shells, Land and Freshwater."—8vo., 1875.

Sussex notes at pp. 34, 71, 72, 75, 76, 79, 81, 83, 86, 88.

1877. **Joseph Weaver.**—Chapter IV. (pp. 307—323) of "The History of Harting, in the County of Sussex—By the Rev. H. D. Gordon," is an account of the mollusca to be found in the parish of Harting near Petersfield.

[Not seen.]

1877. **Jno. W. Taylor.**—"Limax gagates at Hastings."—Q. J. C., Aug. 1877, i. 245.

1878. **J. E. Harting.**—"The Land and Freshwater Mollusca of Sussex"—Zoologist, 1878, Third series, ii. 84—94, 122—126, 161—168.

1878. **Wm. Jeffery.**—"Land and Freshwater Mollusca of Sussex" [additional to his 1868 list].—Zoologist, 1878, 3rd series, ii. 180—181.

1878. **A. W. Langdon.**—The list of mollusca in "The Natural History of Hastings and St. Leonards and the vicinity."

The Mollusca are enumerated at pp. 12—14, with indications of rarity and commonness.

1879. **F. C. S. Roper.**—"On the Additions to the Fauna and Flora of the Cuckmere District during the past year."—Eastbourne N. H. S. paper, Oct. 17th, 1879.

Three species and four varieties of mollusca added.

1880. **J. H. A. Jenner.**—"Land and Fresh Water Mollusca" [including a list of East Sussex species].—Eastbourne N. H. S. paper, March 19th, 1880.

[The bibliography for Oxfordshire will probably be the next undertaken, but before it is published the compiler would be glad to have the opportunity of inspecting Whiteaves' List of Oxfordshire Shells, or the number of the Ashmolean Transactions in which it is contained. Any one who would assist him to the sight of this work would place the compiler under obligation. Letters may be addressed to care of the Editor of the Journal of Conchology.]



ON THE ACTION OF THE HEART IN THE HELICIDÆ
DURING HIBERNATION.

BY CHARLES ASHFORD.

Cold-blooded animals possess very little proper heat, that is to say the internal temperature of their bodies is, in all seasons, nearly the same as that of the medium in which they live. What difference exists has not been satisfactorily determined, but it appears not to exceed two or three degrees and does not concern us on the present occasion. The rate of pulsation of the heart of our Land Mollusks, during the active part of their existence, has long been known to be intimately related to the external temperature, though it cannot be said in a strictly mathematical sense to vary as the temperature. It is accelerated with a rise and reduced with a fall of the thermometer. The coolness of autumn, coupled with the less accessibility of food induces the long torpor in which most of them pass the winter months.

As to the amount of functional activity existing during hibernation authors are not agreed. A few maintain that all the functions are in absolute abeyance. Several allow that a very imperfect respiration is kept up. But most agree in stating, either directly or by implication, that the heart ceases to beat when the animal resigns itself to its winter sleep, and does not resume activity till the following spring. Lister, quoting Peier, is almost alone in saying that "in spite of the state of inertness the beating of the heart, even in the coldest weather, affords a manifest indication of life" (*Exer. Anat.*, p. 164). Unfortunately his opinion was based on the results of direct vivisection or upon appearances after the shell of the animal had been removed, and he does not seem to have suspected that the local irritation

necessarily attendant upon such treatment might of itself induce renewed pulsation.

From observations which will presently be detailed I think that the broad statement that the heart remains motionless throughout hibernation needs modification.

Hibernation is of two kinds, *complete* and *partial*. Such snails as excavate a special domicile in which to pass the winter, and some of those which merely resort to natural cavities for protection, probably retire once for all and do not make their reappearance till mild spring weather has set in. As examples of this class (I refer solely to their practice in this country) may be mentioned: *Helix pomatia* and perhaps *H. aspersa*, *H. nemoralis* and *H. arbustorum*. But there are several species—acknowledged hibernants—which retire in autumn, but reappear again and again in the milder intervals with which our winters are diversified. During these periods of resuscitation the pulsations of the heart are accelerated in obedience to the risen temperature, and the nutritive organs sometimes resume their functions. Thus, not to mention *Vitrina pellucida* and *Helix fusca*, which can scarcely be said to hibernate in an average English winter, I have noticed in active motion *H. sericea* in December and January with a pulse at 17; *H. caperata* apparently feeding in January and February, *H. hortensis* in December, and *H. hispida* in February, pulse 36, the same species in January, pulse 20; *H. pulchella* in January, pulse 34, another year in January, pulse 35; *Cochlicopa lubrica* in December, and *Zonites alliarius* in December, pulse 20, later in the same month, pulse 14, and again in January, pulse 15; *Z. nitidulus* in January, pulse 11; young of *H. rufescens* in February, pulse 26; *Z. cellarius* in December, pulse 14; another individual, pulse 11—*Bulimus acutus*—in December and February. These are evidently partial-hibernants.

Many difficulties occur in the way of observation during the actual hibernation of the animal. Some species have shells too opaque to allow of the heart's action being detected through that envelope, and I have already pointed out a great objection to the removal, even of a part, of the shell; other species with fairly transparent shells are difficult to procure in winter, and opportunities are rarely afforded for convenient observation from day to day of the *same individual* without transferring it to a fresh locality nearer home, where conditions may not be perfectly natural. From these causes it is probable that a long time will elapse before we obtain exact general knowledge of the condition of the Helicidæ during their dormant stage.

In late autumn of 1881, however, I found a single individual of *H. hortensis* and two or three of *Z. cellarius* in hibernation at the base of *Vinca major* on a rockery in the garden, and well positioned for easy inspection. Fixing a thermometer at the spot, I made comparisons of pulse and temperature during the months of December, January and February at suitable intervals. The following are some of the results in the case of *H. hortensis*. The upper numbers give the temperature Fahr. at the time of observation (generally about 9 a.m.), and the numbers beneath them the corresponding pulse rate per minute.

TEMPERATURE 42, 33, 29, 44, 38, 37, 40, 38, 43, 41, 31, 30, 26, 43, 52.

PULSE.....14, 5, 3?, 14, 10, 9, 10, 9, 14, 9, 3?, 4, 3?, 8, 22.

In three instances a mark of doubt is added. The animal, under the influence of the low temperature, had withdrawn itself rather further into its shell, so that the heart took up a position just within the epiphragm, and, though perceptibly in motion, it was not sufficiently in view to leave the numbers clear of doubt.

The error in each case, however, probably does not exceed unity. On three occasions, not recorded, no movement of the heart was perceptible, but whether this was the result of absolute cessation or from concealment of the organ, I cannot say.

With regard to the main point—the action or non-action of the heart during hibernation—these numbers speak for themselves, so far as *H. hortensis* is concerned. But I defer a few remarks till I have given the observations on *Zonites cellarius*, which are these:—

TEMPERATURE... 43, 42, 33, 26, 44, 38, 37, 27, 38, 43, 41, 31, 30, 26, 43, 52.

PULSE 13, 13, 8, 4, 12, 11, 9, 5, 13, 14, 10, 8, 9, 5, 13, 21.

On every occasion throughout the three months the heart of this *Zonites* was in distinct action.

We see then, so far as the enquiry has extended, clear evidence of the continuity of the circulation during the winter as well as the summer life of these animals so long as the thermometer does not fall below 26°—28° F. There is no sudden dislocation when the period of hibernation is entered upon, but an unceasing flow of the vital fluid, more and more sluggish as the temperature falls, but fluctuating with the varying temperature in obedience to the same law as obtains during the active feeding season. It would appear, however, that the limit of endurance is nearly reached when the thermometer shows a few degrees of frost. Unfortunately (for my purpose), the winter of 1881—2 was comparatively mild and no opportunity presented of testing the case at say 10 or 12 degrees of frost. At such a point the animal fluids perhaps congeal, but it would be interesting to discover whether cessation of circulation takes place before this catastrophe or is occasioned by it.

It would be unsafe to generalize from observations on two species only, neither of them complete hibernants, still each is, in most respects, a fair representative of its genus, and it is probable that similar results would be obtained from an examination of any other of the half-hardy species. A few isolated records tend to support this view. Thus I have counted in *Z. radiatulus* 9 pulsations at 27° temp., in *Z. nitidulus* 9 at 31°, in *H. sericea* 9 at 29°, and in the same species 12 at 33 and 17 at 40°. Of the hardy species it is unnecessary to speak. They pursue an active life except in severe weather, and of course their hearts are in action during exercise. There remains then the section of complete hibernants, of these and of the *Lupæ*, whose habits are doubtful, I have nothing to say. Their shells are generally too opaque to admit of direct observation. It would be strange, however, if they differed from the rest except in degree. I see no trustworthy method of arriving at a knowledge of their winter condition unless the ingenious Pulse Indicator can be adapted for experiment upon the lower animals.

At the lower temperatures not only are the contractions of the heart reduced to few in number, but the character of the movements undergoes a change. A full and deliberate contraction will be followed by one, two or three of very small amplitude, and these again, followed after a pause by another full beat. The intervals of recurrence of these imperfect pulsations are unequal in length. The same irregularity is still more marked under abnormally high temperatures, as when a *Zonites* has been for a few minutes in a hot-house. The subsiding movements then take the form of true palpitation, and the strenuous efforts of the animal to change its position proves that it is suffering discomfort.

Though not exactly pertinent to the subject of these notes, I may add that in the case of the *Helix hortensis* mentioned above, the character of the epiphragm altered with the temperature.

Sometimes it was thin, pellucid and entire. At lower temperatures it exhibited a crumpled, white fissured spot, always on the side of the columella. Below or near freezing point it was always opaque and papyraceous. An aperture was sometimes present, sometimes absent, irrespective of temperature. Five times during the three months the epiphragm was destroyed by extrusion, but was invariably renewed the next day. That the animal fed on one, at least, of these occasions was evident from the presence (Feb. 11) within the epiphragm, of a mass of fæcal matter absent the day before. *Zonites cellarius* formed no epiphragm, in fact a considerable part of the prosoma was outside the aperture during the whole of the three months, and the upper tentacles, three parts withdrawn, were frequently visible.

If anyone feels disposed to follow up this enquiry in the case of other species I would suggest *H. cantiana* as a suitable subject. It is less hardy than most I have mentioned, and yet has a fairly transparent shell. Great care must be taken to avoid the presence of disturbing factors. Thus the shell should never be handled. Contact with the warm fingers may have the effect of quickening the pulse 10, 20 or even 30 per cent before a minute has elapsed, means for avoiding this will suggest themselves. My own practice has been to move the shell with a small stick on to a dead leaf and so bring it under the lens if necessary. I also excluded from the register all records of pulse taken when the animal showed signs of motion. Exercise, in snails as in man, is always accompanied with more rapid circulation, even if the motion be merely the protrusion of the head from the shell in the one case, or in the other the simple act of getting out of bed in the morning.



YORKSHIRE LOCALITIES FOR *SPHÆRIUM* AND *PISIDIUM*.

By J. WILCOCK.

[The following list of Yorkshire stations for the species of the above genera was kindly supplied by Mr. Wilcock for the "Transactions of the Yorkshire Naturalists' Union," but unfortunately came to hand too late to be incorporated in the "Report."—ED.]

Sphærium corneum L. River Nidd nr. Cowthorpe; Chapel Haddlesey; Keadby Canal; Stainforth; Went Vale; Dove Canal, Wath; Swinton; and at Knaresbro'.

S. corneum v. **flavescens** Macgill. Rare in the Barnsley Canal near Cudworth.

S. rivicola Leach. Conisbro'; Cold Hiendley Reservoir; Canal at Notton; River Don at Rotherham and Doncaster; Castleford; and fish pond, Crofton.

S. ovale Fér. Rarely near Conisbro'; abundant in canal at Stanley and Altofts.

S. lacustre Mull. Scarce in a pond at Ferrybridge; and in canal at Notton; abundant in a pond on Sharlston Common.

Pisidium amnicum Müll. River Nidd at Cowthorpe; pond at Bramham; Knottingley and Goole Canal; Allerton Bywater; Castleford; Smeaton; Rotherham; Dove Canal, Wath; and Saltaire.

P. fontinale Drap. River Nidd at Cowthorpe; common in several ponds at Haddlesey; Smeaton; Askern; Rotherham; River Dearne, Cudworth; Kirk Sandal; Barnby Don; near Elland; Kirklees near Mirfield; Canal at Saltaire; River Wharfe near Beamsley; Addingham; and Knaresbro'.

P. fontinale v. **Henslowana** Shepp. Knottingley; Stanley Canal, Altofts.

- P. fontinale** v. **pulchella** Jenyns. Scarce in a pond at Ferrybridge; and at Wentbridge.
- P. fontinale** v. **cinerea** Alder. Stream at Hooton Pagnell.
- P. pusillum** Gmelin. Pannal; pond near Castleford; and rarely in a ditch at Newton, Wakefield.
- P. nitidum** Jenyns. Sparingly at Bardsey; Bramham; Rotherham; ponds at Hickleton; Wath nr. Sheffield; Kirklees; Batley; Saltaire; abundant at Newton; in a ditch, St. Swithin's Wood, Wakefield; common about Crofton, Ryhill and Notton.

BIBLIOGRAPHY.

Manual of Conchology, structural and systematic.—By Geo. W. Tryon, junr., Conservator of the Conchological Collection of the Academy of Natural Sciences, Philadelphia. Parts xiv and xv.

Part xiv, which contains 64 pages of letterpress and 41 plates, commences the family Turbinellidæ, embracing the genera *Turbinella* and *Vasum* and the subgenus *Caricella*, and includes 11 species. The family Volutidæ is divided into operculates and inoperculates. In the latter division are the genera *Cymbium*, *Melo* and *Voluta*. In the former are *Volutolyria*, *Lyria* and *Microvoluta*. The fossil genera are *Volutoderma*, *Volutomorpha*, *Rostellites*, *Volutifusus*, *Athleta*, *Leioderma*, *Ptychoris*, *Pleioptygma*, *Cryptochorda* and *Gosavia*. The genus *Ficulopsis* is removed from Volutidæ to Ficulidæ, and *Otocheilus* is considered synonymous with *Cythara* in the the Pleurotomidæ. The family Mitridæ as monographed by Sowerby contains nearly 500 species, but the increased knowledge acquired as to specific variation enables the number to be greatly diminished. The following genera are enumerated:—*Mitra*, *Thala*, *Zierliana*, *Mitroidea*, *Dibaphus*, *Turricula*, *Cylindra* and *Imbricaria*. The fossil genera are

Lapparia, *Fusimitra* and *Conomitra*, none of which however, are characterized by their authors.

Part xv contains 63 pages of letterpress and 15 plates, and continues the account of the Mitridæ, the sections *Aidone*, *Swainsonia*, *Scabricola*, *Cancilla*, *Chrysame*, *Strigatella* and *Zierliana* being considered. A list of 39 species is given at the end, of species undetermined.

In the genus *Thala* 12 species are enumerated and described, in addition to which, four species are mentioned of which figures have never been published.

The genus *Mitroidea* with 6 species, *Dibaphus* with one, and *Turricula* with 24 species and 3 varieties, follow. The section *Costellaria* of *Turricula* has 67 species and several varieties enumerated, but some of the species, as *Æthiopeia Jickeli*, the author evidently considers worthless.

The section is also very extensive, a good number of species being enumerated.

The plates are fully equal to those of preceding parts, and no less than 96 figures are in this one part alone.

A Parasite of *Limnæa truncatula*.—At a meeting of the Linnean Society held on the 2nd of November, 1882, Mr. A. P. W. Thomas drew attention to a series of specimens (under the microscope) and diagrams illustrative of the life history of the Liver-Fluke (*Fasciola hepatica*). His experiments show that the embryos of the fluke, as free cercariæ, burrow into and develop within the body of *Limnæa truncatula*, and thereafter pass with the herbage into the stomach—and ultimately the liver—of the sheep. Salt added to the sheep's diet is found to act as a prophylactic.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

1881.

72nd Meeting.

Held August 4th, 1881, the President, Mr. J. W. Taylor, in the Chair. Minutes of 71st Meeting read and confirmed.

PAPERS READ.

"Note on the shape and structure of the darts of *Helix aspersa*, *H. arbustorum*, *H. nemoralis*, *H. hortensis*, and others; and their value as a means of determining species," by Mr. Chas. Ashford.

SPECIMENS EXHIBITED.

The darts of several of the species of the Helicidæ were shown by Mr. Ashford, in illustration of his notes on the subject.

73rd Meeting.

Held Sep. 8th, 1881, the President, Mr. J. W. Taylor, presided. Minutes of the 72nd Meeting were read and approved. Correspondence was read from Mr. W. Jeffery, Chichester, and Mr. J. W. Cundall, Bristol.

SPECIMENS EXHIBITED.

A large series of shells from various Yorkshire localities, was exhibited by Mr. W. Nelson, particulars of which are entered in the Record Book. Mr. Nelson also showed very fine specimens of *Bulimus acutus* var. *bizona*, from Port St. Mary, Isle of Man; *Helix concinna*, Scarlet Point, Isle of Man; *Limnæa palustris* var. *alba*, and *L. peregra*, Sandwich, Kent; *Pisidium pusillum*, Abbey Holmes, Carlisle; and *Bulimus acutus* var. *bizona*, Tenby, Wales.

A very fine series of land shells from the district round Chichester was sent for exhibition by Mr. W. Jeffery. The list included specimens of *Helix pomatia*, *H. aspersa* var. *grisea*, *H. virgata* (a very fine specimen), *H. caperata* var. *gigaxii*, *Clausilia laminata* var. *albida*, *C. Rolphii*, *Cochlicopa lubrica* var. *hyalina*, *Zonites nitidus*, *Z. excavatus* and *Zonites purus* var. *margaritacea*.

74th Meeting.

Held October 13th, 1881, the President, Mr. J. W. Taylor, occupied the Chair. Minutes of the 73rd Meeting were read and confirmed.

PAPER READ.

"Life History of *Helix arbustorum*," by the President.

75th Meeting.

Held December 1st, 1881, the President, Mr. J. W. Taylor, presided. Minutes of the 74th Meeting were read and adopted. Correspondence was read from Messrs. W. Jeffery, Chichester, J. W. Cundall, Bristol, and Rev. H. Milnes, Winster.

DONATIONS TO THE LIBRARY.

"The Scientific Roll," vol. i., part 1, No. 4, Climate, by Alex. Ramsay, F.G.S.

Reprints of Papers read before the Linnean Society of New South Wales, by John Brazier, C.M.Z.S., viz. :—

1. Notes of recent Mollusca found in Port Jackson and on the coast of New South Wales, and other localities.
2. List of species of Porcellana or Cypræa found in Moreton Bay, Queensland.

3. Remarks on some recently re-described Australian shells.
4. Note on a new variety of *Bulimus Caledonicus*.
5. Notes on some Shells from the Solomon Islands and Australia.

DONATIONS TO THE COLLECTION.

The undernamed series of shells from the neighbourhood of Chichester was presented by Mr. Wm. Jeffery—

Helix aspersa and var. *grisea*; *H. arbustorum*; *H. caperata* and var. *Gigaxii*; *H. Cantiana*; *H. nemoralis*; *H. hortensis*; *H. ericetorum*; *H. obvoluta*; *H. lapicida*; *H. rufescens*; *H. hispida*; *H. pulchella*; *H. rupestris*; *H. rotundata*; *Bulimus obscurus*; *Pupa umbilicata*; *P. marginata*; *Balea perversa*; *Clausilia rugosa*; *C. laminata*; *C. laminata* var. *albida*; *C. Rolphii*; *Cochlicopa lubrica* and var. *hyalina*; *Vertigo pygmæa*; *Vitrina pellucida*; *Zonites cellarius*; *Z. alliarius*; *Z. nitidulus*; *Z. purus* var. *margaritacea*; *Z. radiatulus*; *Z. fulvus*; *Z. crystallinus*; *Carychium minimum*; *Cyclostoma elegans*; *Succinea putris*; *S. elegans*; *Neritina fluviatilis*; *Planorbis corneus*; *Limnæa stagnalis*; *L. peregra*; *L. auricularia*.

Mr. C. Ashford presented six specimens of *Helix hortensis* var. *fusco-labiata*.

A hearty vote of thanks was accorded to Messrs. A. Ramsay, Jno. Brazier, W. Jeffery and C. Ashford for their valuable donations.

PAPERS READ.

“A List of shells found at Bristol and surrounding district,” by Mr. J. W. Cundall.

“A list of shells found in the Ilkley district” (especially prepared for the Rev. Robert Collier’s History of Ilkley), by Messrs. W. Nelson and J. W. Taylor.

A note from Mr. J. Darker Butterell was read, in which, after mentioning the capture of *Vitrina pellucida*, *Zonites cellarius*, *Z. alliarius*, *Z. fulvus* (abundantly), and *Vertigo edentula* (ditto), in

the Long Plantation near Meaux in Holderness on the 20th Nov., 1881, he mentioned that the animal of *Z. cellarius* was *quite white*, even including the tentacles, and inquired if this was a common occurrence, adding that Jeffreys describes the animal as greyish or lead coloured, which is generally the case, so far as Mr. Butterell's experience goes.

SPECIMENS EXHIBITED.

A large series of shells collected by Messrs. W. West and W. D. Roebuck, from various Yorkshire localities were shown, also the following, collected by the former gentleman and exhibited by Mr. Roebuck:—*Helix arbustorum*, *H. concinna*, *H. rotundata*, *H. hispida*, *Zonites alliarius* and *Succinea putris* from Millerdale, Derbyshire; *Clausilia rugosa*, *Helix hispida*, *Balea perversa*, *Cochlicopa lubrica* and var. *lubricoides* from near Morecambe; *Helix rotundata*, Cheedale, Derbyshire; *Pupa umbilicata*, near Levens Hall, Westmoreland; *Balea perversa*, Ambleside; *Pupa umbilicata* and *Balea perversa*, Rydal; *Helix rotundata* and *Cochlicopa lubrica*, Castleton; *Helix hispida* var. *albida*, Tidswell Road, Derbyshire; *Helix aspersa*, Coniston, Lancashire; and *Helix lapicida*, Wormhill, Derbyshire.

76th Meeting.

Held December 15th, 1881, the President, Mr. J. W. Taylor, in the chair.

ANNUAL MEETING.

Minutes of previous meeting were read and confirmed. Correspondence was read from Messrs. J. W. Cundall, B. M. Wright, and A. Leicester. The ANNUAL REPORT was then read by the Secretary as follows:—

In presenting this Report, your Committee are pleased to state that the Society has made steady progress during the past year. There is an increase in the number of members; and the

work for the accomplishment of which the Society was established, has we think, been most satisfactorily pursued.

The Society has met during eleven months of the year for the transaction of business. At these meetings seven papers have been read, namely:—

1. "On a proposed System of Conchological Locality Records," by Mr. W. Denison Roebuck.
2. "Notes from the Isle of Wight," by Mr. C. Ashford.
3. "Unio luteolus and its allied forms," by Prof. F. M. Witter.
4. "A series of Notes on the Structure of the Darts of *H. arbustorum*, *H. aspersa*, *H. hortensis*, *H. nemoralis*, &c., and their value as a means of determining species," by Mr. Chas. Ashford.
5. "The Life-History of *Helix arbustorum*," by the President.
6. "List of shells of the Bristol District," by Mr. J. W. Cundall.
7. "List of Shells found in the Ilkley District," by Messrs. W. Nelson and J. W. Taylor.

SPECIMENS EXHIBITED.

The aggregate number of shells exhibited during the year, both in regard to species and varieties as well as to individual specimens, has been quite equal to that of previous years, though we regret to say that in the Yorkshire exhibits there has been a considerable falling off. Exhibits of Yorkshire shells have been made by Mr. W. Nelson, Mr. W. D. Roebuck and the Secretary. Shells from other localities have been shown by the President (Mr. J. W. Taylor), Mr. W. Nelson, Mr. Robert Scharff, Mr. W. Jeffery and Mr. C. Ashford.

THE LIBRARY.

The following additions have been made to the Library during the year:—

1. "Synopsis Molluscorum viventium Testaceorum," presented by Dr. Kobelt.
2. "Proceedings of the Iowa Academy of Sciences," presented by Prof. F. M. Witter.
3. "The Scientific Roll," vol. i., part 1, No. 4, presented by Mr. A. Ramsay, F.G.S.
4. "Reprints of Papers read before the Linnean Society of New South Wales," presented by Mr. Jno. Brazier, C.M.Z.S., &c.

THE COLLECTION.

The Donations made to the Society's Collection are as follows:—

1. A series of 44 species and varieties of Land Shells, from the neighbourhood of Chichester, presented by Mr. Wm. Jeffery.
2. Six specimens of *Helix hortensis* var. *fusco-labiata*, presented by Mr. C. Ashford.

RECORDER'S REPORT.

Mr. Wm. Denison Roebuck then presented his Report as Recorder to the Society, which read as follows:—

The recorder of Yorkshire localities has to report to the Society that during the year 1881, records—duly authenticated by the production of specimens—of 198 localities for 63 species, have been made, or an average of 3.1 records for each form. This is a slight diminution upon last year, when more specimens were exhibited at the meetings, and the number shows a very great diminution upon the work of the previous five years, for we find that at the present time 1302 localities are registered in the books,

giving an average of 260 per year, the past year it will be remembered having only produced 198 records. There are at present records of localities for 131 species and varieties, of which 3 have been shown for the first time during the past year.

THE BALANCE SHEET

was next read by the Treasurer and adopted. It showed a balance in favour of the Society of £11 1s. 2½d.

THE ELECTION OF OFFICERS

for the ensuing year was next proceeded with, the following being the results :—

President—Mr. Wm. Cash, F.G.S. ; *Vice-Presidents*—Mr. J. W. Taylor and Mr. Wm. Nelson ; *Treasurer and Secretary*—Mr. Thos. W. Bell ; *Recorder*—Mr. W. Denison Roebuck.

Committee (6 members)—W. Hill Evans, M.D., Wm. Jeffery, J. C. Melville, M.A., F.L.S., Wm. Denison Roebuck, J. W. Cundall and Geo. Sherriff Tye.

Meeting,

HELD FEBRUARY 2ND, 1882.

Mr. J. W. Taylor, Vice-President, in the Chair. Minutes of the Annual Meeting were read and confirmed. Correspondence was read from the President (Mr. Wm. Cash, F.G.S.), Rev. H. Milnes, and Messrs. Bryce M. Wright, W. D. Roebuck, J. D. Butterell, J. W. Cundall, and the Linnean Society of N. S. W.

DONATIONS TO THE LIBRARY.

“The Scientific Roll,” vol. i., part 1, No. 5, was presented by the editor, Mr. Alexander Ramsay, F.G.S.

The thanks of the Society were voted to Mr. Ramsay for his donation.

SPECIMENS EXHIBITED.

The Chairman showed several drawings to illustrate the variations which are found in the jaws of *Helix arbustorum*.

Mr. Wm. Nelson also showed a series of water-color drawings of varieties of *Limnæa peregra* contained in his cabinet.

Mr. W. Cundall sent for exhibition a number of shells from the Bristol district. The following is a list:—*Helix hispida*, *H. cantiana*, *H. arbustorum*, *H. rotundata*, *H. pulchella*, *H. virgata*, *H. caperata*, *H. caperata* var. *ornata*, *H. rufescens*, *H. rufescens* var. *albida*, *Balea perversa*, *Valvata cristata*, *Bulinus montanus*, *Azeca tridens* var. *nouletiana*, *Zua lubrica*, *Clausilia rugosa*, *Pupa umbilicata*, *P. secale*, *Achatina acicula*, *Zonites fulvus* var. *mortoni*, *Physa hypnorum*, *Conovulus denticulatus* var. *myosotis*, *Cyclostoma elegans*, *Limax marginatus*, *Succinea putris*, *S. elegans*, *Limnæa peregra*, *Planorbis complanatus*, *P. carinatus*, *P. nitidus*, *P. contortus*, *Ancylus lacustris* and *A. fluviatilis*.

Meeting,

HELD MARCH 2ND, 1882.

Mr. J. W. Taylor presided. Minutes of meeting held 2nd February were read and confirmed. Correspondence was read from Rev. H. Milnes and Messrs. W. Jeffery, J. W. Cundall, H. H. Haines and W. D. Roebuck.

PAPERS READ.

“A List of Land and Freshwater Mollusca of Western Sussex, with a few observations on the distribution and habits of some species,” by Wm. Jeffery.

SPECIMENS EXHIBITED.

Rev. H. Milnes sent for exhibition, specimens of *Helix cincta*, Constantinople; *H. arbustorum* var. *alpestris* and *H. arbustorum*

var. *flavescens* from Derbyshire; *H. aspersa* var. *tenuis*, Jersey; *H. nemoralis* var. *arenicola* from near Gloucester; and *Planorbis corneus* var. *albida*, Yatton near Bristol.

Mr. W. D. Roebuck showed specimens of *Zua lubrica*, *Pupa umbilicata* and *Zonites crystallinus* from the top of Grange Fell, Lancashire.

Mr. W. Nelson exhibited *Zonites alliarius* and *Z. radiatulus* from Walton; *Helix aculeata*, Haw Park; *Planorbis spirorbis*, Reservoir, Cold Hindley; and *Limnæa glabra* var. *elongata* from Havercroft.

Meeting,

HELD APRIL 6TH, 1882.

Mr. J. W. Taylor, Vice-President, presiding. Minutes of previous meeting were read and confirmed. Correspondence was read from Messrs. J. W. Cundall, J. A. Ollard and W. Jeffery.

NEW MEMBER.

Mr. John Alexander Ollard, Ye Hermitage, Forly Hall, Enfield, Middlesex, was nominated for membership.

SPECIMENS EXHIBITED.

Mr. Taylor exhibited a spirally distorted *Planorbis spirorbis* sent by Mr. H. H. Haines from Hayling Island; also *Helix arbustorum* var. *Xatartii*, collected at Camprodon, Spain, by Mr. J. Ponsonby of London.

Meeting,

HELD MAY 18TH, 1882.

Under the Presidency of Mr. J. W. Taylor. The Minutes of the previous meeting were postponed for the insertion of particulars respecting the specimens exhibited by Mr. W. D. Roebuck.

NEW MEMBER.

Mr. J. A. Ollard was elected a member of this Society.

SPECIMENS EXHIBITED.

Mr. W. D. Roebuck exhibited shells collected at Ilkley, and collections from Ingleton, Malham and other localities in Craven, on behalf of Mr. W. West of Bradford; also specimens from Pateley Bridge collected by Mr. W. Storey. A number of shells collected at Esholt were shown for Mr. H. T. Soppitt, and several on behalf of the Rev. H. H. Slater of Ripon. Particulars of all these are entered in the Record Book for Yorkshire Localities.

DONATIONS TO LIBRARY.

"The Scientific Roll," by A. Ramsay, F.G.S.

The Proceedings of the Linnean Society N. S. W.,
part iv., vol. 6, by the Society.

A vote of thanks was in each instance accorded the donors.

Meeting,

HELD JUNE 22ND, 1882.

Mr. W. Nelson, Vice-President, occupied the Chair.

SPECIMENS EXHIBITED.

On behalf of Mr. W. West of Bradford, a number of shells from Yorkshire localities were shown; also *Pupa umbilicata* and *Helix rotundata* from Chewton Priory, Somerset.

The Chairman exhibited a fine collection of *Limnæa truncatula*, most of which were Yorkshire specimens and duly recorded in the Record Book.

CORRECTION.

"In my list of localities for *Helix obvoluta* (p. 316) for *Duneton* read *Duncton*, and for *Storington* read *Singleton*.—W. JEFFERY.

ON THE MACANDREW COLLECTION OF BRITISH SHELLS.

BY A. H. COOKE, M.A., F.Z.S.,

CURATOR OF THE ZOOLOGICAL MUSEUM, CAMBRIDGE UNIVERSITY.

The late Mr. Robert MacAndrew, of Liverpool, left to the University of Cambridge, in 1873, his valuable collection of Shells and an important library of conchological works.

The object of the publication of these brief notes on the British portion of the collection is threefold. Firstly, to serve as a small contribution to the memory of a gentleman who has done so much for the science by his dredgings in the North Atlantic, the Mediterranean, the Gulf of Suez, and off the Western Islands. Secondly, to let it be known that there exists a collection of this kind, easily accessible, to which reference can be made by collectors. Thirdly, in the hope that any conchologists who have the power may also have the good will to supply the very few *desiderata*, so that the collection may be, so far as any collection can be, perfect of its kind.

Of the six species of BRACHIOPODA which inhabit the British seas (*Terebratula Spitzbergensis* Davids., hardly having sufficient claim to rank among the list) the MacAndrew collection contains representatives of 5, the absentee being *Argiope decollata* Chemn. But since Guernsey is its northernmost recorded locality, this shell, in common with *Murex corallinus* Scacchi, *Haliotis tuberculata* L., *Cardium papillosum* Phil., *Teredo pedicellata* Quatref., etc., can only be considered in a political and not a geographical sense an inhabitant of the British Islands.

Of about 159 recorded species of CONCHIFERA, the collection contains 146. Some of these are represented by very fine series in every stage of growth, others by only a single specimen. I subjoin a list of the species not contained, a glance at which

will explain their absence. With the sole exception of *Lepton Clarkiæ*, they may all be considered very rare, while in several places their claim to a place in the list of British species rests only a single discovered example.

Pecten vitreus Chem. N. Hebrides.

Lima Sarsii Lovén. Shetland.

L. elliptica Jeffr. Shetland and W. Scotland.

Arca obliqua Phil. Shetlands. Two valves only.

Leda lucida Lovén. N. of Hebrides.

Limopsis borealis Woodw. N. of Hebrides. One valve only.

Montacuta tumidula Jeffr. Hebrides and Shetland.

Lepton Clarkiæ Clark.

Loripes divaricatus L. English Channel. A few valves.
S. European.

Cardium papillosum Poli. Channel Islands.

Næra rostrata Spengl. Shetlands. One valve only.

Teredo pedicellata Quatref. Channel Islands. Very rare.

In drawing up a complete list of the conchological fauna of any district, one is met by the two difficulties—What constitutes a species? and, What amount of evidence establishes a locality? And perhaps we might add in the third place—What are the limits of the British seas? Into these questions it is not proposed to enter, and accordingly the number of approved British species has been stated at “about” 159. But it is obvious that a list which admits on such evidence as ‘50 miles N. of Hebrides, one valve,’ is one which does not lay down a very severe test of entry, and perhaps on a more rigorous scrutiny the number 159 might be considerably reduced, in which case the number of absentees from the MacAndrew collection, small as it now is, would become considerably smaller. I may mention, however, that while generally

following Jeffreys, I have not been able to recognize *Donax trunculus* L. as an English species, while the reverse has been the case with regard to *Thracia villosiuscula* Macg., which he regards as a variety of *T. papyracea* Poli.

In not a few cases, the names given in the following list differ from them in Jeffreys'. Sometimes this difference arises from a wish to avoid an alteration on the corresponding card, sometimes because the name already on the card seemed rather better known than that given in Jeffreys' list. Thus *Pecten septemradiatus* Müll. in Jeffreys', appears in this list as *P. Danicus* Chem.; *Arca pectunculoides* Scacchi, as *A. raridentata* S. Wood; *Cardium exiguum* Gmel., as *C. pygmæum* Don.; *Venus gallina* L., as *V. striatula* Don.; *Tellina balthica* L., as *T. solidula*, Pult.; etc. For the same, or similar reasons, *Venus exoleta* L., and *Venus lincta* Pult., retain their generic names of *Artemis*, as being better known thereby; *Gastrana fragilis* L., as *Diodonta fragilis*; *Cyamium minutum* Fabr., as *Turtonia minuta*; while I have kept the name of *Syndosmya* in preference to *Scrobicularia*, to denote the four polished or iridescent species (*prismatica*, *nitida*, *alba* and *tenuis*), restricting *Scrobicularia*, as is more usual, to *piperata* alone.

One word about the localities. Cases are quite rare where no locality has been given, and in the ensuing list I have always noted the fact. But what detracts greatly from the value of the localities as a whole, is the persistent recurrence of such labels as "Anglesea, etc.," "Liverpool, etc.," which of course renders uncertain the exact home of all the specimens on that particular card. Still, as a rule, these most unscientific labels only appear in the case of species tolerably common, whose distribution is well known, and the determination of whose precise locality is of no scientific moment.

BRACHIOPODA.

Terebratula cranium Müll. No locality.

Three minute specimens from Jeffreys.

T. caput-serpentis L. Clyde, &c.

T. caput-serpentis L. British Channel.

A new locality, if correct, but not astonishing, as it ranges to N. America and Japan.

Argiope cistellula S. Wood. Sound of Skye.

Five good specimens.

A. capsula Jeffr. No locality.

Four specimens, in a valve of *Venus gallina*; their position has been indicated by arrows, as they are exceedingly minute.

Crania anomala Müll. Hebrides, &c.

A fine series, mostly in situ.

CONCHIFERA.

Anomia ephippium L. Anglesea, &c.

A. ephippium L. var. *Oban*, &c.

A. ephippium L. var. *cyndrica*. Oban.

A. patelliformis L. Anglesea, &c.

Ostrea edulis L. Milford.

One specimen is nearly five inches square.

O. edulis L. var. *parasitica* Turt. Cornwall.

O. edulis L. var. *tincta*. Hebrides.

Pecten pusio L. Isle of Man.

This is a very fine set. Some of them are in situ, two in old valves of *Pectunculus glycymeris*, two in valves of *Mytilus modiolus*.

P. varius L. Britain.

Pecten varius L. var. **nivea** Macg. Oban.

Labelled *P. niveus*. A very fine set, the largest measuring 2.25 inches long by 2.0 broad.

P. opercularis L. Isle of Man, &c.**P. opercularis** L. var. **lineata**. No locality.

Very small specimens.

P. opercularis L. var. **elongata**. No locality.

A single specimen, unmounted and (hitherto) unnamed.

P. danicus Chem. Loch Fyne, &c.

A specimen of the variety *alba* occurs on the same card, and a shell closely approaching the var. *Dumasii* Payr. as described by Jeffreys.

P. danicus Chem. West coast of Scotland.**P. tigrinus** Müll. Scotland and Anglesea.**P. tigrinus** Müll. var. **costata**. Scotland.

Three cards of this variety.

P. tigrinus Müll. var. Anglesea, &c.

Half way between var. *costata* and the type, with strong but undeveloped ribs and striæ.

P. furtivus Lovén. Hebrides.

Four specimens.

P. striatus Müll. Hebrides, &c.**P. similis** Laskey. Clyde.**P. maximus** L. Britain.

The largest specimen measures 5.75 long and 6.5 broad. There are also three specimens (valves) of *P. Islandicus* Müll. (Clyde), one of which has a remarkably fresh appearance.

Lima subauriculata Mont. Oban, &c.**L. Loscombii** Sby. Isle of Man, &c.

Lima hians Gmel. Oban.

A small tray contains a 'nest' of *Lima*. Two of the rarer species, *L. Sarsii* Lovén, and *L. elliptica* Jeffr., are not in the collection.

L. hians Gmel. Clyde.

Avicula tarentina Lam. Plymouth.

Two specimens, one (the more perfect) without locality. On one of the cards is mounted a fragment of *Pecten opercularis*, with the byssus of an *Avicula* attached.

Pinna rudis L. No Locality.

Four specimens, the largest of which is 14.75 inches long.

Mytilus edulis L. Conway, &c.

M. edulis L. Scarboro'.

Labelled *M. dissimilis* Bean, but hardly even a var.

M. ?edulis L. var. **galloprovincialis** Lam. Shetland.

M. edulis L. var. **pellucida** Penn. Ireland.

M. modiolus L. Zetland, &c.

M. modiolus var. Pwelheli.

M. barbatus L. Weymouth, &c.

M. tulipa Lam. Milford, &c.

More correctly known as *M. adriatica* Lam.

M. tulipa Lam. var. **ovata** Sby. Falmouth.

Labelled '*M. barbata* var.?'

M. phaseolina Phil. Guernsey.

M. phaseolina Phil. Loch Fyne, &c.

Modiolaria marmorata Forbes. Oban, &c.

A piece of the integument of an Ascidian is mounted, which contains eleven at least of the *Modiolaria*.

M. marmorata Forbes. Unst.

M. costulata Risso. S. England.

M. discors L. Isle of Man.

M. discors L. Southampton.

M. nigra Gray. Oban and Zetland.

Crenella rhombea Berk. Guernsey.

C. rhombea Berk. Weymouth.

C. decussata Mont. Unst., &c.

Nucula decussata Sby. Oban, &c.

N. decussata Sby. Loch Fyne.

N. nucleus L. Anglesea, &c.

N. nucleus L. Guernsey.

N. nucleus L. var. **radiata** Hanl. Carnarvon Bay.

As *N. radiata*. Common in Torbay.

N. nitida G. B. Sby. Anglesea.

N. tenuis Mont. Loch Fyne.

Leda pygmæa Münt. Hebrides.

L. pygmæa Münt. Hebrides.

A card labelled "varieties of *Leda pygmæa*, hitherto known only as fossil: discovered alive in the Hebrides, 1845."

Leda caudata Don. Anglesea, &c.

L. caudata Don. North Sea.

L. caudata Don. Clyde and Zetland.

L. caudata Don. var. **brevirostris**. Hebrides.

[Two cards (not uniform with the rest of the collection) contain dredged specimens of *L. oblonga* and *L. truncata* Brown; no locality given. Both are pleistocene fossils.]

Limopsis aurita Brocchi. Unst, and Zetland.

A perfect specimen, and a single valve. Another very young specimen, in a box, is labelled in Jeffreys' handwriting.

Pectunculus glycimeris L. Britain.

Arca raridentata Wood. Hebrides and Cape Clear.

Arca lactea L. Portland, Torbay and Sandwich.

A. tetragona Poli. Scotland.

All the specimens are very small.

Galeomma Turtoni Zool. Journ. Channel Islands.

Lepton squamosum Mont. Anglesea.

L. nitidum Turt. var. **convexum** Ald. Bantry.

L. sulcatulum Jeffr. Guernsey.

In Jeffreys' handwriting.

Montacuta substriata Mont. Irish Sea.

M. bidentata Mont. Hebrides.

M. bidentata Mont. Unst.

M. bidentata Mont. North Sea.

M. bidentata Mont. Liverpool.

M. ferruginea Mont. Murray Firth.

Lasea rubra Mont. Ilfracombe.

A card labelled "*Montacuta purpurea*, Scarbro'," in Bean's hand, is only *Lasea rubra* Mont. It approaches the var. *pallida*.

L. rubra Mont. Scarboro'.

L. rubra Mont. Isle of Man.

Kellia suborbicularis Mont. Murray Firth, &c.

K. suborbicularis Mont. var. **lactea**. Zetland.

Loripes leucoma Turt. S. England.

Lucina spinifera Mont. Oban, &c.

L. borealis L. Zetland, &c.

Axinus flexuosus Mont. Anglesea, Hebrides, &c.

A. flexuosus Mont. Zetland, 80 f.

Very young specimens.

A. Croulinensis Jeffr. Shetland.

Four valves, in pill box.

A. Croulinensis Jeffr. No locality.

The card containing this contains also specimens of

A. ferruginosus Forbes, and *A. abyssicola* Forbes. The labels appear to be in Jeffreys' hand, the generic name given being *Clausina*. But he now considers *abyssicola* identical with *ferruginosa* (Vol. II., p. 253, Brit. Conch.)

Axinus ferruginosus Forbes. No locality.

A. ferruginosus Forbes. Loch Fyne.

Diplodonta rotundata Mont. Bantry, &c.

Turtonia minuta O. Fabr. Belfast.

Cardium aculeatum L. Torbay.

These are all, except 3 young ones, "rolled" specimens, and consequently had lost their spines. I cannot understand Jeffreys saying it is "scarcely ever found in a living state." I have dredged it alive in Torbay, and it is frequently cast up alive on the Paignton sands.

C. echinatum L. Britain.

All poor specimens, the tubercles being entirely rubbed away.

C. rusticum L. Torbay.

C. pygmæum Don. Milford Haven.

C. pygmæum Don. Southampton.

C. pygmæum Don. Balta Sound.

The card is labelled *C. nodosum*, but of 20 specimens only one is *nodosum*, the rest being *pygmæum*.

C. fasciatum Mont. Anglesea, &c.

C. minimum Phil. Hebrides.

As *C. suecicum* Reeve.

C. nodosum Turt. Loch Fyne.

C. nodosum Turt. Balta Sound.

Labelled *C. pygmæum* Don. (= *C. exiguum* Gmel).

C. edule L. Stornaway.

C. edule L. Scilly and Oban.

C. edule L. Murray Firth.

Cardium edule L. var. **rustica**. S. England.

Though labelled "var. *Lamarckii*," yet I feel sure that this must be the var. referred to by Jeffreys under the name *rustica*. One of the cards which is labelled var. *rustica*, does not all accord with the description of that variety. I have referred it to the type.

C. edule L. **monstr.** No locality.

Excessively inequivalve, one valve being .3 inch longer than the other which is nearly flat, while the former is very ventricose—giving the whole shell something of the appearance of a *Terebratula*.

C. norvegicum Spengl. Hebrides.**Isocardia cor** L. Oban.**Cyprina Islandica** L. Carnarvon Bay.

A very fine series from 4.75 inches long by 4.5 broad, to .08 square.

Astarte sulcata DaCosta. Hebrides.**A. sulcata** DaCosta. Anglesea, &c.**A. sulcata** DaCosta. --Eddystone.

The locality deserves notice. Ribs few and very strong.

A. sulcata DaCosta. Zetland, 80 f.**A. sulcata** DaCosta var. **elliptica** Brown. Oban, &c.

Labelled *A. elliptica*.

A. sulcata DaCosta var. **elliptica** Brown. Zetland.**A. sulcata** DaCosta var. **elliptica** Brown. Loch Fyne.

A single valve, very much produced at both ends.

A. compressa Mont. Murray Firth.**A. compressa** Mont. Loch Shell and Hebrides.**A. compressa** Mont. var. **striata** Leach. North Sea.**A. compressa** Mont. var. **globosa**. Loch Fyne.

This var. occurs on the large card labelled "Loch

Fyne, &c." Most of the specimens, however, appear of the var. *globosa*.

Astarte triangularis Mont. Orkney.

A. triangularis Mont. Iona, &c.

Five valves of *A. crebricostata* Forbes (Hebrides), are subfossil; as is also *A. arctica* Gray (Zetland).

Circe minima Mont. Milford.

C. minima Mont. Hebrides.

Artemis exoleta L. Carnarvon Bay.

One very large specimens measures 2.3 inches long by 2.4 broad.

A. lincta Pult. Anglesea, &c.

A. lincta? var. West of Lewes.

One specimen might belong to Jeffreys' variety *compta*, being ruder and more ventricose, otherwise they do not differ from the type.

Venus chione L. Carnarvon Bay.

The largest specimen (a very fine one) is exactly 3.5 inches broad. A second card contains 3 specimens (no locality), whose epidermis is of a dark olive green, instead of a brown or fawn colour.

Venus fasciata DaCosta. Anglesea, &c.

V. casina L. Orkney.

This is a most beautiful series of this not common shell.

V. verrucosa L. Cardigan Bay.

V. ovata Penn. Anglesea, &c.

V. ovata Penn var. *lactea*. Zetland, &c.

V. striatula Don. var. *gibba*. Kerrera.

V. striatula Don var. *laminosa*. No locality.

V. striatula Don var. Zetland, 90 f.

These three cards contain representatives of three

different varieties, but none, as it seems to me, of the type. The third is a small colourless variety, flattened and posteriorly much produced.

Tapes aureus Gmel. Scilly.

T. aureus Gmel. Pwllheli.

Shells small, but a good series: the largest corresponds to Jeffreys' var. *ovata*.

T. virgineus L. Zetland, &c.

Largest specimen 2·4 inches broad by 1·5 long.

T. virgineus L. var. Zetland.

White and almost lustreless, very large (2·6 by 1·75).

It almost deserves mention by Jeffreys.

T. virgineus L. var. **Sarniensis** Turt. Zetland.

T. pullastra Mont. Beaumaris, &c.

T. pullastra Mont. var. **perforans**. Beaumaris.

T. decussatus L. Bantry, &c.

Lucinopsis undata Penn. Bantry.

One specimen (a single valve) is much distorted by having both ends produced, and an obtuse angle formed in the lower margin.

Gastrana fragilis L. Pwllheli.

A locality not given by Jeffreys, whose only Welsh locality is "coast of Pembrokeshire, MacAndrew." Is there a mistake here? Largest specimen 1·5 inches broad by 1·15 long.

Tellina balaustina L. West of Ireland.

Five single but perfect valves.

T. crassa Penn. Bantry, Cardigan Bay, &c.

A fine series of 20 specimens, varying in breadth from 2·1 to 1·2 of an inch. One or two, being destitute of the usual rays, may be assigned to the var. *albida*.

T. solidula Pult. Liverpool, &c.

The extreme commonness of this species, no doubt has prevented the collector obtaining better series.

Tellina tenuis DaCosta. Liverpool, &c.

T. fabula Gron. Liverpool, &c.

T. fabula Gron. var. **ovata**. Zetland.

T. incarnata L. Isle of Man.

Jeffreys shows good reason for believing that *T. incarnata* of L. is our *T. tenuis* of DaCosta, and he adopts Solander's name of *squalida*, which as a descriptive epithet, is hardly applicable. The shell is very common at Guernsey and Herm, a locality which Jeffreys does not give. MacAndrew's is not a first-rate series.

T. donacina L. Anglesea, &c.

T. pygmæa Phil. Orkney.

[*Tellina proxima* Brown. One perfect specimen, two single valves (each retaining much of the epidermis) and a fragment); locality—Loch Fyne. Jeffreys relegates this to the category of extinct species, so far as our coasts are concerned, and I suppose we must follow him, though it occurs in a recent state on the shores of Denmark and Norway.]

Psammobia tellinella Lam. Isle of Man, &c.

A fine series of 25 specimens.

P. costulata Turt. Cornwall, Shetland, &c.

P. Ferroensis Chemn. Bantry and Anglesea.

P. vespertina Chemn. Cardigan Bay.

P. vespertina Chemn. Bantry.

Donax anatinus Lam. Stornaway.

These would seem rather to belong to the var. *turgida* of Jeffreys.

Donax anatinus Lam. Dogger Bank, 15 f.

The var. *nitida* of Jeffreys.

D. politus Poli. Bantry.

Not a very representative set. Very common at Herm, where I have taken it living at low water mark spring tides.

Ervilia castanea Mont. Cornwall.

Fourteen single valves.

Macra solidus L. Anglesea, &c.

The largest specimen is 2·4 inches broad by 1·8 long.

Another on the same card, which however belongs to var. *truncatus* Mont., is 2·25 inches broad by 2·15 long.

M. solidus L. var. *truncatus*. No locality.

Not labelled hitherto.

M. solidus L. var. *ellipticus* Brown. Anglesea, &c.

More usually known as *M. ellipticus*.

M. subtruncatus DaCosta. Ardrossan.

M. subtruncatus DaCosta var. *striatus* Brown. No locality.

Not labelled hitherto.

M. stultorum L. Anglesea, &c.

M. stultorum L. var. *cinereus*. Anglesea, &c.

M. glauca Born. South of England.

Not a good specimen. I have taken it alive at extremely low tides at a particular spot in Herm with *Solen siliqua*, the only way of distinguishing their lurking-places being that the *Solen* made an oval, but the *Macra* a round hole over its burrow in the wet sand.

Lutraria elliptica Lam. Torbay, &c.

L. elliptica Lam. var. Bantry.

This may be the var. *alternata* of Jeffreys.

L. oblonga Chem. No locality.

Two rather poor specimens.

Syndosmya prismatica Mont. North Sea.

S. prismatica Mont. Carnarvon Bay.

Twelve fine specimens.

S. intermedia Thoms. Zetland, &c.

S. alba Wood. Loch Long.

Some of these are much more deeply striated than the type.

S. tenuis Mont. Ramsgate.

S. tenuis Mont. Seaford.

Scrobicularia piperita Bellon. Liverpool, &c.

Solecurtus candidus Renier. Bantry, I. of Man & Hebrides.

Largest specimen 2.25 inches broad by 1.1 long.

S. coarctatus Gmel. Torbay.

Ceratisolen legumen L. Anglesea.

Solen pellucidus Penn. Anglesea, &c.

S. ensis L. Britain.

The largest specimen, .75 inches long by .575 broad, would seem distinct from Jeffreys' var. *arcuata* of *Solen siliqua*, not being 'abruptly truncated' at either end. If *Solen ensis* however, it is very large.

S. siliqua L. Britain.

Largest specimen 1.5 inches long by .90 broad.

S. marginatus Pult. Anglesea.

Pandora rostrata Lam. Jersey.

P. rostrata Lam. var. **obtusa** Leach. Anglesea.

I follow Jeffreys in considering this the deep water variety of *P. rostrata*.

Lyonsia norvegica Chemn. Hebrides, &c.

A fine series of 16 specimens.

Thracia phaseolina Lam. Anglesea, Zetland, &c.

T. villosiuscula Macg. Bantry, &c.

Jeffreys considers this a variety of the preceding;

but the present is much more ovate, ventricose, and not nearly so abruptly and angularly truncated at the posterior end.

Thracia pubescens Pult. Plymouth.

Four fine specimens—the largest 3·25 inches broad by 2·15 long.

T. convexa Wood. Cornwall, Bantry and Belfast.

Three specimens from as many localities. The smallest is singularly aberrant, having the beaks almost central, and without the peculiar arch or curve, while the ridge is almost obliterated.

T. convexa Wood. Hebrides.

Five very young specimens.

T. distorta Mont. Isle of Man.

T. distorta Mont. var. **truncata**. Portland.

Seven characteristic specimens.

Poromya granulata Nyst. Croulin Island.

Two specimens, one full grown.

Neæra abbreviata Forbes. Loch Fyne.

Ten specimens.

N. costellata Desh. Loch Fyne.

Four specimens, one half an inch broad.

N. cuspidata Oliv. Loch Fyne.

Corbula nucleus L. Anglesea, &c.

C. nucleus L. var. **rosea**. Weymouth.

Mya arenaria L. Britain.

Largest specimen 3·0 inches broad by 5·0 long.

M. arenaria L. Beaumaris and Zetland.

Young specimens.

M. arenaria L. Bantry and Dublin.

Young specimens.

M. truncata. Britain.

Sphænia Binghami Turt. Torbay, Anglesea, Clyde. &c.

All on one card.

Panopæa plicata Mont. Zetland and Loch Erebol.

Labelled *Saxicava fragilis* Nyst., but see Jeffreys' vol. iii., p. 76. There are seven specimens from the former, three from the latter locality.

Saxicava rugosa L. Torbay.

S. rugosa L. Anglesea.

S. rugosa L. var. *arctica*. Hebrides.

S. rugosa L. var. *arctica*. Zetland, &c.

S. rugosa L. var. *arctica*. Hebrides.

Fossil valves, 1·6 inches broad by ·75 long.

S. Norvegica Spengl. North Sea.

Labelled *Panopæa arctica* Gould, but see Jeffr., vol. iii., p. 74. The card contains one perfect specimen, with sheath complete, of this rare shell, and two odd but perfect valves, the largest of which is 3·12 inches broad and 1·75 long.

S. Norvegica Spengl. Clyde.

A fossil but wonderfully preserved specimen, the interior being in places quite fresh and glossy. Breadth 3·8 inches, length 2·6.

Venerupis Irus L. Weymouth.

Seven fine specimens.

Gastrochæna modiolina Lam. Weymouth.

Two specimens are in the case, in situ.

Pholas dactylus L. Britain.

P. candida L. Isle of Wight.

P. parva Penn. Torquay.

P. parva Penn. Torbay.

Labelled in error *P. dactylus* L.

P. parva Penn var. *quadrangula* ? Portland.

Pholas crispata L. Britain.

Pholadidea papyracea Turt. Torquay.

Largest specimen 1.25 inches broad, exclusive of
calciform process.

P. papyracea Turt. Portland.

P. papyracea Turt. var. Torquay.

Smaller and stronger.

Xylophaga dorsalis Turt. Clyde.

Three valves.

X. dorsalis Turt. No locality.

In situ.

Teredo Norvegica Spengl. Torbay.

Pallets only.

T. navalis L. Yarmouth.

As *T. marina* Sellius.

T. megotara Hanl. Seaford.

T. megotara Hanl. Swansea.

[Not indigenous are *T. malleolus* Turt. (Seaford), *T. bipennata* Turt. (no locality), and *T. palmulata* Lam.]

GASTEROPODA AND PTEROPODA.

Of about 248 marine shell-bearing Gasteropoda, there are in the collection 208. The minute species naturally constitute the main body of the absentees. If we were to leave *Rissoa*, *Odos-tomia* and *Cerithiopsis* out of the reckoning, the proportion would be about 187 to 167. The general rarity of the species not included will be gathered from the following list. One of them (*Triton cutaceus*) I can supply from my own collection, having found several dead specimens at Herm.

Chiton discrepans Brown.	Chemnitzia clathrata Jeffr.
Trochus Duminyi Regn.	C. excavata Phil.
Lacuna tenella Jeffr.	Torellia vestita Jeffr.
Rissoa lactea Mich.	Cerithiopsis Barleei Jeffr.
R. Jeffreysi Wall.	C. pulchella Jeffr.
R. proxima Ald.	C. metaxa Della Chiaje.
R. soluta Phil.	C. costulata Möll.
Jeffreysia opalina Jeffr.	Triton nodiferus Lam.
Homalogyra rota F. & H.	T. cutaceus L.
Aclis Gulsonæ Clark.	Fusus Islandicus Chem.
Odostomia minima Jeffr.	F. buccinatus Lam.
O. clavula Lovén.	F. fenestratus Turt.
O. Lukisi Jeffr.	Pleurotoma rugulosa Phil.
O. umbilicaris Malm.	P. nivalis Lovén.
O. conspicua Ald.	P. carinata Biv.
O. unidentata Mont.	Cylichna nitidula Lovén.
O. plicata Mont.	C. alba Brown.
O. diaphana Jeffr.	Utriculus ventrosus Jeffr.
O. obliqua Ald.	U. expansus Jeffr.
O. dolioliformis Jeffr.	Philine angulata Jeffr.
Stilifer Turtoni Brod.	P. nitida Jeffr.

As to nomenclature, there occur variations similar to those in the Conchifera, and for similar reasons. Thus I have found, and left, *Acmaea* instead of *Tectura*, *Pilidium fulvum* instead of *Tectura fulva*, *Pileopsis* instead of *Capulus*, *Erato* instead of *Marginella*, *Tornatella* instead of *Actæon*, *Amphisphyra hyalina* instead of *Utriculus hyalinus*, etc.

Again, I have kept, simply because it would else involve an alteration on the card, and because there was no likelihood of confusion, *Trochus exiguus* Pult. (= *exasperatus* Penn.), *Rissoa crenulata* Mich. (= *cancellata* DaCosta), *R. Beanii* Hanl. (= *reticu*

lata Mont.), *R. sculpta* Phil. (= *cimicoides* Forbes), etc.; *Skenea depressa* Flem. (= *planorbis* Fabr.), *Natica helicoides* Johnst. (= *islandica* Gmel.), *Murex corallinus* Scacchi (= *aciculatus* Lam.), etc. *Odostomia* as given in Jeffreys, on a similar principle, I have divided into *Odostomia Chemnitzia* and *Eulimella*. *Ianthina exigua* Lam., which does not appear on Jeffreys' list, I have inserted. *Nassa nitida* Jeffr. I have relegated to what it doubtless is, a var. of *N. reticulata* L. *Hydrobia ulvæ* Penn. appears with the other *Hydrobiæ*, as a fresh water shell. *Assimineæ*, however, I have left as marine.

The remarks as to localities, which were made on the Conchifera, apply here with equal force, except that there are a rather larger proportion here to which I have had to append "no loc."

Only one representative of the Pteropoda can fairly be said to inhabit the British seas. This is well represented, both in type and varieties, in the collection.

SOLENOCONCHIA.

Siphonodentalium lofotense Sars. No locality.

Jeffreys' handwriting. Three specimens.

Cadulus subfusiformis Sars. Zetland.

Three specimens.

Dentalium entalis L. Scotland.

Two or three of the larger specimens are considerably eroded at the posterior end.

D. entalis L. Galway Bay.

This is not a satisfactory card. It contains eleven specimens. Of these, five belong to *D. entalis* and six to *D. Tarentinum*. The pink tip, and more particularly the strongly striated, dull, not glossy surface, settle the difference.

D. tarentinum Lam. Southampton, &c.

GASTEROPODA.

I.—MARINE.

Chiton (Acanthochites) fascicularis L. Britain.

C. (A.) fascicularis var. *gracilis* Jeffr. Milford Haven.

Labelled "*C. discrepans* Brown?" I can answer for it that it is not so. In the first place there is only one English locality (out of the Channel Islands), and that is in Cornwall; and secondly the granules are distinctly round, whereas in *C. discrepans* they are always oval. Besides, Jeffreys gives Milford Haven as a locality in which MacAndrew had taken this var. *gracilis*.

C. (Acanthopleura) Hanleyi Bean. Hebrides.

C. (Lepidopleurus) cancellatus J. Sowb. Clyde.

C. (L.) asellus Chem. Oban, &c.

C. (L.) asellus Chem. Anglesea, &c.

C. (L.) asellus Chem. Zetland.

The longitudinal streaks are very prominent on this variety.

C. (L.) marginatus Penn. Anglesea, &c.

Wrongly labelled *cinereus* L., which is the equivalent of the last given. Largest specimen '875 long.

C. (L.) albus L. Hebrides.

C. (L.) ruber L. Isle of Man.

C. lævis Penn. Isle of Man, &c.

A good series of 16 specimens, some in situ.

C. marmoreus Fab. Hebrides, &c.

Largest specimen a giant, 1'5 by '8.

Patella vulgata L. Anglesea, &c.

P. vulgata L. var. *athletica*. Scarbro'.

=*P. depressa* Penn.

P. vulgata L. var. *intermedia*. South of England.

Labelled "*P. athletica*?"

Helcion pellucidum L. Anglesea, &c.

Very fine specimens.

H. pellucidum L. Shetland.

Smaller, thinner, the blue lines often indistinct or wanting.

H. pellucidum L. Isle of Man.

An intermediate form.

H. pellucidum L. var. *lævis* Penn. Isle of Man, &c.

Labelled in error *P. cærulea*, which is a variety of *P. vulgata*.

Acmaea testudinalis Müll. Hebrides.

A. testudinalis Müll. Orkney.

A single small specimen.

A. virginea Müll. Orkney.

Pilidium fulvum Müll. Loch Fyne, &c.

P. fulvum Müll. var. *albida*. Loch Fyne, &c.

Included without notice on the same card.

Lepeta cæca Müll. Loch Fyne.

Propilidium ancyloides Forbes. Isle of Müll.

Three dead and two living specimens only.

Puncturella noachina L. Loch Fyne, &c.

Emarginula reticulata L. Anglesea, &c.

E. rosea Bell. Weymouth.

E. crassa Sby. Loch Fyne and Carnarvonshire.

Two specimens from each locality. The labels were evidently misplaced, and I have transposed them. The two larger specimens (three times the size of the others) were labelled as if from Carnarvonshire, which is most unlikely. The locality is the most southern recorded, and it is possible that these specimens have something to do with Jeffreys' remark in his appendix—"Anglesea, Miss Roberts fide MacAndrew."

Fissurella reticulata Don. Anglesea, &c.

Pileopsis Hungarica L. Weymouth, &c.

Largest specimen a giant, 2.5 by 1.75. Another card occurs with a single shell labelled *P. militaris?*, Cape Clear. I cannot agree with Jeffreys in thinking this a young specimen of *P. Hungarica*; the beak is strongly reflected over the posterior side, whereas in young shells of *P. Hungarica* it is always nearly central. I should pronounce it certainly a worn specimen of *P. militaris* L., a West Indian shell, probably introduced in ballast.

Calyptrea Sinensis L. Dartmouth and Milford.

Halotis tuberculata L.

No mark of locality, but of course from the Channel Islands.

Scissurella crispata Flem. Hebrides.

One broken specimen.

S. crispata Flem. No locality.

Two living specimens.

Cyclostrema Cutlerianum Clark. Exmouth.

C. nitens Phil. No locality.

C. serpuloides Mont. Lamlash Bay.

Labelled in Bean's handwriting "*Skenea divisa* Fleming, rare."

Trochus (Margarita) helycinus Fabr. Unst.

T. (M.) helycinus Fabr. Skye.

T. (M.) glaucus Müll. Sound of Skye.

T. (M.) Grœnlandicus Chem. Oban.

T. (M.) Grœnlandicus Chem. Zetland.

T. (M.) Grœnlandicus Chem. Orkney.

T. (M.) Grœnlandicus Chem. var. *dilatata*. Zetland.

T. (M.) Grœnlandicus Chem. var. No locality.

More elevated, with many distinct impressed striæ,
surface less smooth and shining.

Trochus (M.) Grœnlandicus Chem. var. *lævior*. Skye.

T. (M.) amabilis Jeffr. Zetland.

Three perfect specimens (one with operculum), two
imperfect, of this rare and lovely shell.

T. (Gibbula) magus L. Carnarvonshire.

T. (G.) magus L. var. *alba*. Hebrides.

T. (G.) tumidus Mont. Anglesea, &c.

As usual, the northern are much larger than the
southern specimens.

T. (G.) tumidus Mont. South of England.

T. (G.) cinerarius L. Britain.

T. (G.) cinerarius L. var. *electissima*. Weymouth.

T. (G.) cinerarius L. var. Orkney.

T. (G.) umbilicatus Mont. Isle of Man, &c.

T. (G.) umbilicatus Mont. var. *Agathensis* Red. Guernsey.

T. (Trochocochlea) lineatus DaCosta. Cornwall, &c.

Not so large as specimens from the Channel Islands.

T. (Zizyphinus) Montacuti Wood. Weymouth.

T. (Z.) striatus L. Torbay.

T. (Z.) exiguus Pult. Weymouth.

T. (Z.) millegranus Phil. Arran, &c.

T. (Z.) millegranus Phil. var. *pyramidata*. Weymouth.

T. (Z.) granulatus Born. Isle of Man.

T. (Z.) zizyphinus L. Scotland.

T. (Z.) zizyphinus L. Anglesea.

T. (Z.) zizyphinus L. var. *granulifera*. No locality.

T. (Z.) zizyphinus L. var.? Isle of Man.

T. (Z.) zizyphinus L. *monstr.* Anglesea.

T. (Z.) occidentalis Migh. Zetland.

Three specimens, two full grown.

Phasianella pullus L. Milford.

P. pullus L. Anglesea.

P. pullus L. Weymouth.

Lacuna crassior Mont. Anglesea, &c.

L. divaricata Fabr. Moray Firth.

L. divaricata Fabr. Zetland.

L. divaricata Fabr. Anglesea.

L. divaricata Fabr. var. Southampton.

Labelled *L. canalis* Mont.

L. puteolus Turt. Isle of Man.

L. puteolus Turt. var. Milford.

L. puteolus Turt. var. Southampton.

Labelled *L. Montagui* Turt., see Jeffr., vol. iii., p. 351.

L. pallidula DaCosta. Anglesea, &c.

Littorina obtusata L. Hebrides, &c.

Many of these are the var. *ornata*.

L. obtusata L. var. *fabalis* Turt. Ireland.

Labelled in error *L. jugosa* which is a var. of *L. rudis*.

L. obtusata L. var. *fabalis* Turt. Scarboro'.

Labelled in error *L. Beanii* Macg.

L. neritoides L. Britain.

L. rudis Maton. Hebrides, &c.

L. rudis Maton var. *saxatilis* Johnst. Penzance.

L. rudis Maton var. Scarboro'.

Labelled *L. rudissium* Bean, but see Jeffr., vol. iii., p. 368.

L. rudis Maton var. *tenebrosa* Mont. South of England.

As *L. tenebrosa*.

L. rudis Maton var. *jugosa* Mont. Isle of Wight.

Labelled in error *L. palliata* Say, which = *L. littoralis* L., a North American shell, now found in our pleistocene beds.

Littorina rudis L. var. Scarboro'.

Labelled *L. zonaria* Bean.

L. rudis L. var. Southend.

Apex wholly or partly eroded.

L. rudis L. var. **nigrolineata** Dön. Lands End.

The var. *sulcata* of Leach. Where MacAndrew got his name from I do not know. It does not occur in Donovan's British Shells.

L. rudis L. var. Scarboro'.

Labelled *L. neglecta* Bean, but the same as the var. *saxatilis*.

L. rudis L. var. No locality.

Bright red with faint ridges.

L. littorea L. Britain.

L. littorea L. var. Falmouth.

Probably the var. *turrita* of Jeffreys.

L. littorea L. var. Milford.

Perhaps the var. *brevicula* of Jeffreys.

Rissoa striatula Mont. Dartmouth.

The largest specimen has a prominent varix on the body whorl.

R. crenulata Mich. Scilly.

One specimen (which I have marked on the card with an asterisk) belongs to *R. Zetlandica* Mont.

R. Beanii Hanl. Hebrides.

Two specimens on this card are *R. crenulata*.

R. Beanii Hanl. Scilly, &c.

R. Beanii Hanl. Lamash.

R. sculpta Phil. Zetland, &c.

According to Jeffreys the present species is not the *R. sculpta* of Philippi, but *R. cimicoides* of Forbes.

R. punctura Mont. Scilly.

Rissoa punctura Monf. Croulin Island.

R. abyssicola Forbes. Loch Fyne, &c.

Nineteen specimens of this rare species.

R. Zetlandica Mont. Zetland, &c.

R. costata Mont. Dartmouth.

R. parva DaCosta. Islay, &c.

R. parva DaCosta var. **interrupta**. Islay.

R. parva DaCosta var. **interrupta**. Milford.

R. parva DaCosta var. **interrupta**. Between Land's End and Cape Clear, 56 fathoms.

R. inconspicua Alder. Torbay.

R. inconspicua Alder var. **variegata**. Isle of Cumbrae.

Labelled *R. Goodallii* Alder. Where MacAndrew gets the name, I am unable to say. It is certainly not the *Persephone Goodallii* of Leach. I am indebted to Dr. Jeffreys for the determination of this species.

R. albella Lovén var. **Sarsii** Jeffr. Orkney.

R. albella Lovén var. **Sarsii** Jeffr. Balta, Zetland.

R. rufilabrum Ald. Islay.

R. costulata Ald. No locality.

R. labiosa Mont. Southampton.

R. labiosa Mont. var. **elata** Phil. Tenby.

R. labiosa Mont. var. **elata** Phil. Islay.

R. vitrea Mont. Hebrides.

R. vitrea Mont. Dartmouth.

R. pulcherrima Jeffr. Guernsey.

R. semistriata Mont. Torbay.

R. fulgida Ads. Torbay.

R. striata Ads. No locality.

Many specimens much distorted.

R. cingillus Mont. Moray Firth.

R. cingillus Mont. var. **rupestris**. Weymouth.

Rissoa cingillus Mont. var. **rupestris**. Ilfracombe.

R. cingillus Mont. var. **rupestris**. Barrow.

Besides the above, the following foreign species are included:—*Rissoa Bryerus* Mont. (a West Indian shell), from Laskey's Collection; *Helix decussatus* of Montagu, from Laskey's Collection; and one, apparently a *Rissoina* and certainly not British.

Barleeia rubra Ads. Scilly, &c.

Jeffreysia diaphana Alder. No locality

J. globularis Jeffr. No locality.

Two specimens.

Skenea depressa Flem. Scarboro'.

Label in Bean's handwriting.

Homalogyra atomus Phil. Tenby, &c.

Cæcum trachea Mont. Bantry, &c.

C. glabrum Mont. Torbay.

Turritella communis Risso. Weymouth.

T. communis Risso. Zetland.

T. communis Risso var. **nivea**. Zetland.

T. communis Risso var. **gracilis** Drap. Cork.

Truncatella truncatula Drap. Weymouth.

Scalaria Turtonæ Turt. Belfast, &c.

S. communis Lam. Liverpool, &c.

Not a very good set of specimens.

S. Trevelyana Leach. South of Ireland.

S. clathratula Adams. Scilly, &c.

The collection also contains a fragment, apparently of the last whorl of *Scalaria Grænländica*, Duncansby Head. See, for a few remarks on this fragment, Jeffreys, vol. iv., p. 97.

Aclis unica Mont. Scarboro'.

From Bean.

A. ascaris Turt. Zetland.

A single specimen.

Aclis supranitida S. Wood. Bantry Bay.

Five fine specimens.

A. supranitida S. Wood. Isle of Man.

A. Walkeri Jeffr. Zetland.

Five specimens, from Jeffreys.

Odostomia cylindrica Alder. Falmouth.

O. cylindrica Alder. Lamlash Bay.

O. truncatula Jeffr. Exmouth.

O. albella Lovén. Falmouth.

Labelled *O. rissoides* Hanl.; corrected (as several in this genus) by Jeffreys.

O. pallida Mont. Zetland.

O. pallida Mont. Loch Fyne.

O. conoidea Brocchi. Oban, &c.

O. acuta Jeffr. Loch Fyne and Bantry.

O. turrita Hanley. Loch Fyne.

O. insculpta Mont. No locality.

O. decussata Mont. Falmouth.

O. rissoides Hanl. var. *nitida* Ald. Zetland.

[Unknown.—“*O. pellucida* Jeffr.” No locality.]

Chemnitzia indistincta Mont. Dartmouth.

C. interstincta Mont. Scarboro’.

C. fenestrata Forbes. Torbay.

C. fenestrata Forbes. Southampton.

Large specimens, nearly 2 inch long.

C. fenestrata Forbes. Dartmouth.

C. scalaris Phil. Milford and Dartmouth.

C. scalaris Phil. var. *rufescens* Forbes. Oban, &c.

C. rufa Phil. Anglesea, &c.

A fine series of 25. The largest is a giant, measuring more than 5 inch long. Some of the specimens appear to be the var. *fulvocincta* Thomps.

Chemnitzia eximia Jeffr. No locality.

C. spiralis Mont. Zetland.

C. elegantissima Mont. Milford.

C. elegantissima Mont. Bantry and Torbay.

C. pusilla Phil. Guernsey.

Eulimella Scillæ Scacchi. Oban, &c.

Jeffreys unites *Eulimella*, as well as *Chemnitzia* with *Odostomia*.

E. acicula Phil. Bantry, &c.

E. acicula Phil. var. *ventricosa*. Murray Firth.

Labelled *E. affinis* Ph., which Jeffreys (vol. iv., p. 171) regards as his var. *ventricosa* of *E. acicula*. One specimen on the card, by an extraordinary oversight, is *Eulima polita* L., young.

E. acicula Phil. var. *ventricosa*. Guernsey.

E. nitidissima Mont. Arran.

Two specimens from each locality.

E. nitidissima Mont. Murray Firth.

Ianthina communis Lam. Tenby.

Two splendid specimens, the largest 1·25 by 1·35.

I. communis Lam. Ireland.

I. exigua Lam. Ireland.

Rarely cast on our shores.

Eulima polita L. Anglesea, &c.

A very fine series of 32 specimens, in various stages of growth.

E. polita L. Bantry.

Three specimens, now marked with an asterisk, are *E. intermedia*.

E. polita L. Zetland.

One specimen, the smallest, is *E. intermedia*.

E. intermedia Cantr.

Mixed with *E. polita* on the two last cards, now distinguished by asterisks attached to each shell.

Eulima distorta Desh. Lamlash Bay.

Some specimens very distorted.

E. distorta Desh. var. **gracilis**. Loch Fyne.

All the specimens on this card are referable to this var., though not distinguished as such; they are all singularly undistorted.

E. stenostoma Jeffr. Zetland, 90 f.

One fine specimen of this very rare shell.

E. subulata Don. Ireland and Anglesea.

E. bilineata Alder. Oban, &c.

Natica helicoides Johnst. Zetland, &c.

Six good specimens.

N. Grœnlandica Brok. North Sea.

N. sordida Phil. Firth of Clyde, &c.

N. catena DaCosta Britain.

N. nitida Don. Anglesea.

N. nitida Don. var. Murray Firth.

N. nitida Don. var. Zetland.

N. Montagui Forbes. Arran.

N. Montagui Forbes var. **albula**. Zetland.

Velutina flexilis Mont. Loch Fyne.

One specimen of this rare shell.

V. lævigata Penn. Anglesea, &c.

V. lævigata Penn. Kyleakin.

Lamellaria perspicua L. Cardigan Bay.

L. perspicua L. Murray Firth, &c.

Another card, labelled *L. tentaculata* Mont., Murray Firth, &c., contains the male of *L. perspicua*, which is about one-third the size of the type, has a much broader mouth, and might well be taken for another species.

Adeorbis subcarinatus Mont. Tenby.

Label in Bean's handwriting.

Trichotropis borealis B. and S. Oban, Zetland, &c.

Aporrhais pes-pelecani L. Carnarvon Bay.

A. pes-pelecani L. var. **albida**. Zetland, 80 f.

A. pes-pelecani L. monstr.

One of these specimens is very remarkable. A second wing, or rather spike, projects behind the ordinary wing, which is abnormally thickened by many calcareous layers which are flaky and could be peeled off. The second or older spike is evidently 'dead' and is almost hidden by barnacles, but the continuation of the rib of the body whorl leaves no doubt as to its true character. No doubt the shell met with a grave accident when almost mature; instead of the damaged wing being repaired, a new wing or something approaching a wing was made.

A. MacAndreæ Jeffr. Zetland.

Six mature, two immature. Labelled *A. pes-carbonis*

Brogn., which is a tertiary fossil.

Cerithium metula Lovén. Zetland.

Two perfect specimens, one imperfect.

C. reticulatum DaCosta. Clyde, &c.

Largest specimen '55 long.

C. perversum L. Sandwich.

Cerithiopsis tubercularis L. Scilly, &c.

Purpura lapillus L. Anglesea, &c.

P. lapillus L. Caldy Island.

P. lapillus L. var. **imbricata**. Rhoscollyn.

A very large series (45) of this beautiful variety.

P. lapillus L. var. **major**. Swansea.

P. lapillus L. var. **major**. Southampton.

Length: 2'3 inches.

Purpura lapillus L. var. Barmouth.

Save for the size (1.5 by .75), this would accord with Jeffreys' var. *minor*: the ridges are very strong. Not very far removed from the type.

P. lapillus L. var. Beaumaris.

Spire aslant.

Buccinum undatum L. Cork.**B. undatum** L. Wales.**B. undatum** L. North Sea.**B. undatum** L. Nymph Bank.**B. undatum** L. Zetland.

This may be the var. *flexuosa* of Jeffreys, but though the spire is produced, the shell is not 'more slender': the ribs are very strong and curved.

B. undatum L. var. *paupercula* King. Southampton.**B. undatum** L. var. *paupercula* King. Carnarvon Bay.**B. undatum** L. var. 1. No locality

(These numbers, var. 1, var. 2, etc., correspond with the numbers on the cards. They do not correspond with the numbers of the vars. in Jeffr.) Thin, elongated, longitudinal ribs faint, epidermis smooth.

B. undatum L. var. *pelagica* King. Zetland.

Jeffreys' only locality is Dogger Bank. It is solid and not 'thinner than usual.'

B. undatum L. var. *Zetlandica* Forbes. Zetland.

Acuminated, but otherwise agreeing with the description in Jeffr.

B. undatum L. var. 2. No locality.

Thick, elongated, but not quite so much so as in monstr. *acuminatum*.

B. undatum L. var. 3. Stornaway.

Agrees with monstr. *acuminatum*, save that the

whorls are not flat, and the ribs are very prominent.

Buccinum undatum L. var. 4. Berwick Bay.

Small, very thick and solid.

B. undatum L. var. 4. Ayrshire.

B. undatum L. var. 5. Morayshire.

Large, very thick and solid.

B. undatum L. monstr. **sinistrorsum**. No locality.

Four fine specimens.

B. undatum L. monstr. **carinatum**. No locality.

Two fine specimens.

B. undatum L. monstr. **acuminatum**. No locality.

Three fine specimens.

B. Humphreysianum Bennett. Zetland.

B. Humphreysianum Bennett var. **lactea**. Zetland.

Buccinopsis Dalei J. Sby. No locality.

Murex erinaceus L. Torbay.

M. corallinus Scacchi. Jersey.

Lachesis minima Mont. No locality.

Trophon muricatus Mont. Weymouth, &c.

T. muricatus Mont. Guernsey.

T. Barvicensis Johnst. Berwick Bay, Hebrides, &c.

T. clathratus L. Anglesea, Hebrides, &c.

Fusus antiquus L. Britain.

Largest example, 7 inches by 4.

F. antiquus L. var. **contrarius** L. Britain.

F. antiquus L. var. Carnarvon Bay.

F. antiquus L. var. Ireland and Hebrides.

Four fine specimens.

F. Norvegicus Chem. North Sea.

Two fine specimens.

F. Turtoni Bean. North Sea.

F. gracilis DaCosta. Zetland.

Fusus gracilis DaCosta. East coast, &c.

F. gracilis DaCosta var. Zetland.

Deep water specimens.

F. propinquus Alder. Zetland.

F. propinquus Alder. North Sea.

Largest specimen 2·1 inches long.

F. propinquus Alder var. **turrita**. Shetland.

A longer, thinner shell, with a more turreted spire and consequently a deeper suture.

F. Berniciensis King. North Sea.

A single fine specimen, close on 3·5 inches long.

F. Berniciensis King. Zetland.

Two very young specimens.

F. Jeffreysianus Fischer. Plymouth.

Four good specimens. But query its specific distinction from *gracilis*.

Nassa reticulata L. Anglesea, &c.

N. reticulata L. var. Southampton.

N. reticulata L. var. **nitida**. Harwich.

Jeffreys "with some misgiving" gives it as *N. nitida*.

It is shorter, stumpier and broader for its size than the type, more lustrous, the longitudinal ribs are stronger and not nearly so numerous, while the spiral ridges are fainter; thus the shell has not the tessellated appearance characteristic of the type.

N. incrassata Müll. Orkney.

N. incrassata Müll. var. **minor**. Moray Firth.

N. incrassata Müll. var. Scarboro'.

Labelled, in Bean's hand, "*Buccinum breve* Montagu."

N. pygmæa Lam. Weymouth.

N. pygmæa Lam. var. Torbay.

Labelled, in Bean's hand, "*Nassa varicosa* Turton."

Columbella Haliæti Jeffr. Zetland.

Two good specimens of this rare shell.

C. Haliæti Jeffr. "Off Unst, 75—80 f., 1864."

Two specimens in box, labelled in Jeffreys' hand.

C. nana Lovén. Zetland.

Five specimens, two in a recent state of preservation.

One specimen of *Columbella Holbölli* Möll., is included. Locality, "Belfast." It is regarded as a glacial fossil by Jeffreys, its southern living limit being Bergen.

Defrancia teres Forbes. Orkney and Berwick Bay.**D. gracilis** Mont. No locality.**D. Leufroyi** Mich. Hebrides.**D. Leufroyi** Mich. var. **carnosula** Jeffr. Zetland.

The largest specimen is .875 inch long.

D. linearis Mont. Hebrides, &c.**D. linearis** Mont. var. Orkney.**D. linearis** Mont. var. Orkney.**D. reticulata** Ren. No locality.

Labelled "*Mangelia asperima*, (sic.) Brown," which I do not know. It is a single specimen and rather worn, but there can be no doubt what it is.

D. purpurea Mont. Hebrides.**D. purpurea** Mont. var. **Philberti**. Hebrides.

The two specimens of the variety are on the same card as the type. I have put a pencil cross under them and recorded them on the back of the card.

D. purpurea Mont. var. **oblonga**. Lundy Island.

There may be some mistake in this locality.

Jeffreys says it is confined to the Channel Islands.

Pleurotoma striolata Scacchi. Bantry Bay.**P. striolata** Scacchi var. Bantry Bay.**P. attenuata** Mont. Torbay.

Pleurotoma costata Don. Scilly, &c.

P. costata Don. Cornwall.

Labelled *P. costata* Don., var. *Metcalfii* Penn.
There is some mistake. *P. Metcalfii* Hanl. = *P. levigata* Phil., and is only found in the Channel Islands, while the present specimens are but slight varieties, if varieties at all, of *P. costata*, and I know of no var. *Metcalfii* of *P. costata*.

P. costata Don. var. **coarctata**. Hebrides.

P. brachystoma Phil. Hebrides, &c.

P. nebula Mont. Anglesea, &c.

P. nebula Mont. var. **elongata** Jeffr. No locality.

P. septangularis Mont. Anglesea, &c.

P. lævigata Phil. South of England.

P. rufa Mont. Anglesea, &c.

P. rufa Mont. vars. Anglesea, &c.

On the same card.

P. turricula Mont. Zetland, &c.

P. turricula Mont. var. **rosea**. Hebrides.

P. turricula Mont. var. East coast.

P. turricula Mont. var. Anglesea.

P. turricula Mont. var. North Sea.

P. Trevelyana Turt. East coast.

Erato lævis Don. Hebrides, &c.

Trivia Europæa L. Britain.

Very good series, showing every variation of growth.

Another card contains two monstrosities.

Ovula patula Penn. Cornwall, &c.

Largest specimen exactly 1 inch by .5.

Cylichna acuminata Brug. Loch Fyne, &c.

MacAndrew had placed it among the *Cypræidæ*, under the generic name of *Volvula*.

Cylichna umbilicata Mont. Murray Firth, &c.

C. cylindracea Penn. No locality.

C. cylindracea Penn. Loch Fyne, &c.

Dwarf specimens, nearly approaching the var. *linearis*.

Utriculus mamillatus Phil. Exmouth.

As *Bulla mammillata*.

U. truncatulus Brug. Murray Firth.

Labelled *Cylichna truncata* Adams. See Jeffreys,

vol. iv., p. 423.

U. truncatulus Brug. Scarboro'.

Labelled *Bulla truncata* Montagu, in Bean's writing.

Young specimens, apparently, for they are not a quarter the size of the Scotch shells.

U. obtusus Mont. Liverpool.

U. obtusus Mont. Unst and Zetland.

Perhaps the var. *Lajonkaireana*.

U. obtusus Mont. No locality.

Amphisphyræ hyalina Turt. Murray Firth.

Akera bullata Müll. Ireland.

A. bullata Müll. var. Zetland.

Much smaller. Labelled *A. Hanleyi*, A. Adams.

Tornatella fasciata Lam. Anglesea, &c.

Another card contains some minute specimens, possibly (but no locality is given) of the var. *tenella* Lovén.

Bulla hydatis L. Exmouth.

B. Cranchii Leach. Scotland.

= *B. utriculus* Brocchi.

Scaphander lignarius L. Anglesea, &c.

I have taken it alive at a very low tide, in the harbour of St. Peter's port, Guernsey.

S. lignarius L. var. Scilly and Hebrides.

Milk-white.

Philine scabra O. Müll. North Sea, &c.

P. catena Mont. Scarboro'.

P. quadrata S. Wood. North Sea.

P. punctata Clark. Scarboro'.

One specimen remaining of three (the other two have disappeared) from Bean.

P. pruinosa Clark. Sound of Skye.

Three specimens, one full grown.

P. aperta L. Liverpool, &c.

Aplysia punctata Cuv. Hebrides.

Pleurobranchus membranaceus Mont. Britain.

P. plumula Mont. Torbay.

Alexia bidentata Mont. Isle of Man.

A. bidentata Mont. var. *alba*. Ilfracombe.

The *Auriculidæ* I found in great confusion. Both these cards were labelled *Auricula alba*. Two cards containing identical specimens of *Alexia myosotis*, Drap. (= *denticulata* Mont.) were labelled *Auricula bidentata* and *Alexia denticulata* respectively. The var. *ringens* of this latter species was labelled *Auricula persona*. Two cards were not labelled at all.

A. myosotis Drap. Sandwich.

As *Auricula bidentata*.

A. myosotis Drap. Youghal.

Somewhat more obese, but hardly a variety.

A. myosotis Drap. var. *ringens*. Anglesea.

As *Auricula persona*. One specimen has the outer lip remarkably fluted with plaits, quite after the fashion of tropical *Melampfi*.

Otina otis Turt. Ireland.

Assimineia Grayana Leach. Greenwich.

PTEROPODA.

Spirialis Flemingii Forbes. Loch Staffin.

S. Flemingii Forbes var. **MacAndreeæ**. Britain.

Labelled, by a bad mistake, *Hemifusus* (for *Heterofusus*) *MacAndreeæ*.

S. Flemingii Forbes var. **Jeffreysii**. South of Id. of Arran.

Thus I should designate the card labelled '*Peracle Flemingii*.' It may be only the fry of the type, but the description of the variety ('spire shorter') exactly corresponds.

FRESH WATER AND LAND SHELLS.

The fresh water and land shells, as represented in this collection, do not call for any lengthy comment. I believe I am right in saying that this part of the collection was made by Mr. MacAndrew before he had made very much way in the study of conchology; this will account for some of the omissions and mistakes, though the latter are few.

Out of 125 land and freshwater species (reckoning *Hydrobia ulvæ* as non-marine and *Testacella Maugei* as now naturalised), the collection contains 114. The absentees are characteristic; they are as follows:—

Pisidium roseum Sch.

Geomalacus maculosus Allm.

Limax gagates Drap.

L. marginatus Müll.

L. flavus L.

L. lævis Müll.

Limax tenellus Müll.

Testacella haliotideæ Drap.

Vertigo Moulinsiana Dup.

V. pusilla Müll.

V. angustior Jeffr.

Zonites nitidulus and *Z. nitidus*, as well as *Planorbis lineatus*, were not in the original collection. I have added them. Two other species, though they appear in the list, do so only in the sense of having once formed a part of the collection, the card alone remaining, the shells being irretrievably broken. These are *Limnæa involuta* and *Vertigo alpestris*.

CONCHIFERA.

FRESHWATER.

- Cyclas cornea* L. Liverpool.
C. cornea L. Elgin.
C. cornea L. var. *flavescens*. Liverpool.
C. cornea L. var. *pisidioides*. Regent's Canal.
 As *C. pisidioides*.
C. rivicola Leach. Scarboro'.
C. pallida Gray. Regent's Canal.
C. caliculata Drap. Liverpool.
Pisidium amnicum Müll. River Barrow, Ireland.
P. amnicum Müll. No locality.
P. fontinale Drap. Cheshire.
 As *P. Henslowianum* Shep.
P. fontinale Drap. var. *Henslowiana* Shep. Swansea.
 As *P. Henslowianum* Shep.
P. fontinale Drap. var. *pulchella* Jen. Britain.
 As *P. pulchellum*.
P. fontinale Drap. var. *pulchella* Jen. Scarboro'.
 As *P. pulchellum*.
P. fontinale Drap. var. *pulchella* Jen. Wigtonshire.
 As *P. pulchellum*.
P. fontinale Drap. var. *pulchella* Jen. Britain.
 As *P. Henslowianum*.

Pisidium fontinale Drap. var. **cinerea** Ald. Scarboro'.

As *P. cinereum*.

P. pusillum Gmel. Britain.

P. pusillum Gmel. var. **obtusalis** Pfr. Britain.

As *P. obtusale*.

P. pusillum? Gmel. var. **obtusalis** Pfr. Bressa, Zetland.

P. nitidum Jenyns. Britain.

Unio tumidus Phil. No locality.

U. tumidus Phil. var. **ovalis** Mont. No locality.

U. tumidus Phil. var. No locality.

U. pictorum L. No locality.

As *Unio ovalis*.

U. margaritifer L. (and pearls). River Tay.

Anodonta cygnea L.

A. anatina L.

Unable myself to see any specific distinction between the two, I have simply recorded them and left the cards in the collection as I found them.

Dreissena polymorpha Pall. Birmingham.

Hundreds of specimens in situ on a piece of branch.

GASTEROPODA.

FRESH WATER.

Neritina fluviatilis L. Ireland.

N. fluviatilis L. Birmingham.

Paludina contecta Müll. Yorkshire; &c.

As *P. Listeri* F. & H., which name must be quite given up.

P. vivipara L. Lancashire, &c.

P. vivipara L. var. **unicolor**. River Lea.

Bithinia tentaculata L. Scarboro'.

B. Leachii Shep. Battersea.

Valvata piscinalis Müll. Liverpool.

Hydrobia similis Drap. Tilbury.

Labelled *Rissoa anatina*.

H. similis Drap. Greenwich.

From Jeffreys.

H. ventrosa Mont. No locality.

H. ulvæ Penn. Southampton.

H. ulvæ Penn. Lewes.

One or two of the specimens appear to be the var.

Barleei Jeffreys.

H. ulvæ Penn. Liverpool.

H. ulvæ Penn. var. **Barleei** Jeffr. Loch Fyne.

H. ulvæ Penn. var. **octona**. Guernsey.

As *Rissoa* (i.e., *Hydrobia*) *ventrosa*.

Planorbis lineatus Walker. Buckenham, Norfolk.

Not in the original collection. I have added it.

P. nitidus Müll. Elgin, &c.

As Jeffreys (vol. i., p. 82) says he is not aware of this species having been found living with the preceding, I may record that I have found them living in the same pond at Buckenham, Norfolk, *P. lineatus* being by far the most abundant.

P. nautilus L. Belfast.

Labelled *P. imbricatus* Müll., of which I find no record in Jeffr. One specimen on the card was so obviously not *P. nautilus* that I have removed it. It was *P. glaber*.

P. albus Müll. Anglesea.

P. glaber Jeffr. No locality.

"From Jeffreys," but no locality.

P. glaber Jeffr. Holy Island and Essex.

As "*P. levis* Alder."

Planorbis spirorbis Müll. Battersea.

P. vortex L. Surrey.

P. vortex L. Elgin.

P. carinatus Müll. Surrey.

P. marginatus Drap. Surrey.

P. marginatus Drap. monstr. Rochdale.

From Bean. Turreted and deeply umbilicated.

P. corneus L. Scarboro'.

P. corneus L. var. *albida*. Middlesex.

I have it also from Cambridge. Jeffreys only mentions Surrey.

P. contortus L. Surrey.

P. contortus L. Elgin.

Physa hypnorum L. Liverpool.

P. hypnorum L. Elgin.

P. fontinalis L. Liverpool.

P. fontinalis L. var. *albina*. Britain.

A card also occurs with three specimens of "*P. acutus* Drap., Britain." It is probable they are from the *Victoria Regia* tank in Kew Gardens, where I have taken them abundantly.

Limnæa glutinosa Müll. Britain.

L. involuta Thomps. Killarney.

This species is recorded in the sense of having once been in the collection. The single specimen has been completely smashed.

L. peregra Müll. Liverpool, &c.

Several other cards though differently labelled must be referred to the type, not even to varieties. Such are the cards labelled *Limnæus lineatus*, Scarboro' (distinct from the var. *lineatus* below), *Limnæus lacustris*, Ireland, and *Limnæus fossarius*, Antrim.

Limnæa peregra Müll. var. **Burnetti** Ald. Newcastle.

As *Lymnæa Burnetti*.

L. peregra Müll. var. **lacustris** Leach. Isle of Lewes.

L. peregra Müll. var. **lacustris** Leach. Zetland.

L. peregra Müll. var. **intermedia** Fér. No locality.

Hitherto unlabelled, but unmistakable.

L. peregra Müll. var. **ovata** Drap. Ireland.

Not far removed from the type.

L. peregra Müll. var. **sinistrorsa**. Scarboro'.

Labelled "*Limnæus lineatus* var. reversed."

L. auricularia L. Surrey.

L. stagnalis L. Anglesea.

This locality can hardly be correct as regards the three largest specimens, one of which is 2.25 inches long by 1.25 broad.

L. palustris Müll. Anglesea.

All rather dwarfed.

L. palustris Müll. var. **corvus** Gmel. Britain.

The locality is very unsatisfactory. The specimens are not so ventricose as those Jeffreys describes. He gives .65 inch as the width of a specimen 1.3 in length. But while most of these shells closely approach that length, none of these are more than .5 wide.

L. truncatula Müll. No locality.

Not labelled.

L. glabra Müll. Liverpool.

Ancylus fluviatilis Müll. Carnarvonshire.

A. lacustris L. Antrim.

A. lacustris L. Scarboro'.

From Bean.

GASTEROPODA.

LAND.

Arion ater L. Scarboro'.

From Bean.

Limax agrestis L. Elgin.

L. agrestis L. Scarboro'.

As *Limacellus obliquus* Turt. From Bean.

L. arborum Bouch. Elgin.

L. arborum Bouch. Scarboro'.

As *Limacellus arboreus* Clark. From Bean.

L. maximus L. Elgin.

Testacella Maugei Fér. Bristol.

Wrongly given as *T. haliotideae* Drap. Originally labelled rightly, but changed for the worse. They are all dried specimens, with the shells in situ.

Succinea putris L. Scarboro'.

S. putris L. Llangadock.

S. putris L. Anglesea.

As *S. amphibia* Drap.

S. elegans Risso. South of Ireland.

As *S. gracilis* Alder.

S. elegans Risso. Elgin.

As *S. Pfeifferi* Rossm.

S. elegans Risso. No locality.

S. oblonga Drap. Swansea.

S. oblonga Drap. No locality.

From Jeffreys.

Vitrina pellucida Drap. Liverpool.

Zonites cellarius Müll. Torquay.

As '*Helix*' *cellaria*. All the species of *Zonites* are thus named.

Zonites alliarius Müll. Anglesea.

Z. nitidulus Drap. Putney.

Not in the original collection. I have added it.

Z. purus Alder. Elgin.

By an extraordinary oversight, the midmost of the five specimens on this card is a *Vitrina pellucida*!

Z. purus Alder. Scarboro'.

As *Helix Alderi* Bean.

Z. radiatulus Alder. Scarboro'.

Z. nitidus Müll. Cambridge.

Not in the original collection. I have added it.

Z. excavatus Bean. Liverpool.

Z. crystallinus Müll. Anglesea.

Z. crystallinus Müll. Scarboro'.

Z. fulvus Müll. Murrayshire.

Helix lamellata Jeffr. Anglesea.

H. lamellata Jeffr. Scarboro'.

As *H. Scarburgensis* Bean.

H. aculeata Müll. Anglesea.

As *H. spinulosa* Mont.

H. pomatia L. Surrey.

H. aspersa Müll. Britain.

H. aspersa Müll. var. **exalbida**. Britain.

H. aspersa Müll. var. **conoidea**. Britain.

H. aspersa Müll. var. **sinistrorsa**. Britain.

One specimen of each on the same card as the type.

H. nemoralis L. No locality.

H. nemoralis L. var **hortensis** Müll. Britain.

As *H. hortensis*.

H. nemoralis L. var. **hybrida** Poir. Yorkshire.

As *H. hybrida*.

H. nemoralis L. var. **fasciis hyalinis**. No locality.

Hitherto unlabelled.

Helix arbustorum L. Anglesea.

H. cantiana Mont. Kent.

H. cantiana Mont. Dulwich.

Wrongly labelled *H. carthusiana*.

H. cartusiana Müll. South of England.

H. rufescens Penn. Tenby.

H. rufescens Penn. Dumfriesshire.

H. rufescens Penn. var. *albida*. Somerset.

H. concinna Jeffr. Anglesea.

So I should regard the card labelled "*H. hispida*,
Anglesea."

H. hispida L. Isle of Wight.

H. hispida L. No locality.

Several on this card appear to be *H. concinna*.

H. sericea Müll. Liverpool.

As *H. granulata* Alder.

H. sericea Müll. Anglesea.

H. sericea Müll. var. *cornea*? Scarboro'.

As *Helix globulus* (no doubt for *globularis*) Jeffr.

H. revelata Mich. Guernsey.

Labelled *H. revelata* Fér., which = *sericea* Müll.

H. fusca Mont. Scarboro'.

H. fusca Mont. Liverpool.

H. pisana Müll. Dublin.

As *H. cingenda* Mont.

H. virgata DaCosta. Anglesea.

H. virgata DaCosta var. Dublin.

A remarkable variety, not mentioned by Jeffreys.

It is pure chalky white, with semitransparent white
bands, closely resembling those of the var. *fasciis hyalinis*
of *H. nemoralis*.

H. caperata Unst. Britain.

- Helix ericetorum** Müll. Isle of Man.
H. ericetorum Müll. Ilfracombe..
H. rotundata Müll. Anglesea.
H. rotundata Müll. var. **alba**. Cheshire.
H. umbilicata Mont. Anglesea.
H. umbilicata Mont. Tenby.
H. pygmæa Drap. Scarboro'.
H. pygmæa Drap. Ireland.
H. pulchella Müll. Anglesea.
H. pulchella Müll. var. **costata**. Anglesea.
 As *H. crenella* Müll.
H. lapicida L. Portland.
H. lapicida L. Scarboro'.
H. obvoluta Müll. Buriton, Hants.
Bulimus acutus Müll. Anglesea, &c.
B. acutus Müll. var. **bizona**. Devon.
B. acutus Müll. var. **inflata**. Isle of Man.
B. montanus Drap. Buriton, Hants.

Another card, from Bean, contains a single specimen from the same locality.

- B. obscurus** Müll. Anglesea.
Pupa secale Drap. Isle of Wight.
P. secale Drap. Boxhill.
P. anglica Fér. Scarboro'.

Labelled on two cards as *Pupa anglica* Bean, but this must be an error. The name is due to Férussac, while Bean appears to have been the first to make the shell known as a native of England.

- P. anglica** Fér. Portmarnock.
P. umbilicata Drap. Anglesea.
 As *P. muscorum* L.
P. umbilicata Drap. var. **alba**. Anglesea.
 On the same card.

Pupa marginata Drap. Antrim.

Vertigo antivertigo Drap. Cheshire.

As *V. palustris* Leach.

V. pygmæa Drap. Ireland.

V. pygmæa Drap. Elgin.

V. alpestris Alder. No locality.

I only record this species as having once belonged to the collection. The two specimens on a small card (label apparently in Jeffreys' handwriting) have been irretrievably smashed.

V. substriata Jeffr. Cheshire.

V. substriata Jeffr. Harrogate.

V. edentula Drap. Ireland.

V. edentula Drap. Scarboro'.

V. edentula Drap. Portmarnock.

V. minutissima Hartm. Northumberland.

Balea fragilis Drap. Elgin.

B. fragilis Drap. Belfast.

Clausilia rugosa Drap. Anglesea.

C. rugosa Drap. var. **dubia** Drap. Dover.

A new locality, if correct.

C. rugosa Drap. var. **dubia** Drap. No locality.

C. Rolphii Gray. Petersfield.

Three specimens. A small box also contains six specimens of *C. Rolphii* (two under the name of *C. Mortilleti*) and one of *Azeca tridens*, from Charlton and Charing, Kent.

C. biplicata Mont. Battersea.

Erroneously labelled *C. ventricosa*.

C. laminata Mont. Scarboro'.

C. laminata Mont. var. **albida**. No locality.

No label.

Cochlicopa tridens Pult. Newcastle-on-Tyne.

C. lubrica Mont. Anglesea.

C. lubrica Mont. var. **hyalina**. Anglesea.

On the same card.

Achatina acicula Müll. Anglesea.

Carychium minimum Müll. Anglesea.

Cyclostoma elegans Müll. Devon.

Acme lineata Drap. Scarboro'.

From Bean.

[Mr. Cooke is very pleased to be able to announce that, as a first result of his publication of the *desiderata* of the MacAndrew collection at Cambridge, he has received from Mr. J. T. Marshall, of Penrith House, Cheltenham, a parcel containing the following species:—*Lepton Clarkiæ*, *Cardium papillosum*, *Teredo pedicellata*, *Chiton discrepans*, *Rissoa lactea*, *R. soluta*, *Jeffreysia opalina*, *Odostomia unidentata*, *O. plicata*, *O. dolioliformis*, *Pisidium roseum*, *Limax marginatus*, *Vertigo Moulinsiana* and *V. angustior*. This generous and welcome gift will be at once incorporated with the rest of the collection.—ED.]

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY,
1882.

Meeting,

HELD JULY 20TH, 1882.

Mr. J. W. Taylor, Vice-President, occupied the Chair. Minutes of the previous Meeting were read and approved.

DONATION TO THE LIBRARY.

Report of the Smithsonian Institution, by the Trustees. A vote of thanks was accorded the donors for their valuable gift.

SPECIMENS EXHIBITED.

The Chairman showed a number of shells which he had recently collected while on a continental tour, including specimens of *Helix obvoluta* from Heidelberg; *H. arbustorum*, collected just below the glacier at Grindelwald; *H. sylvatica*, falls of the Rhine, Dachsen; and *H. lapicida* and *Clausilia rugosa* from Ghiessbach.

Mr. Taylor further showed a series of *Helix arbustorum* collected by Mr. L. E. Emmett near Sheffield. This series embraced a very fine distortion, and specimens of the varieties *pallida* and *flavescens*.

Collections made about Knaresbro', Killinghall and Burton Leonard, were exhibited by Mr. Wm. Nelson.

On behalf of Mr. W. West of Bradford shells from Shipley Glen, Dringhouses and other localities, were shown. The series from Shipley included specimens of *Pupa ringens*; also *Cochlicopa lubrica* from near Windermere, and *Pupa umbilicata* from head of Derwentwater.

Specimens from the Upper Wharfedale, and Bingley and Scarbro' districts, were shown by Mr. W. D. Roebuck.

Meeting,

HELD AUGUST 24TH, 1882.

Mr J. W. Taylor, Vice-President, presided.

The Minutes of the previous Meeting were read and approved. Correspondence, having reference to an exchange of Proceedings, was read from the Linnean Society, New South Wales. It was resolved that copies of the Proceedings of this Society, since their first publication in the Journal of Conchology, be sent to the Linnean Society of New South Wales, through their Agents, Messrs. Trubner & Co., Ludgate Hill.

SPECIMENS EXHIBITED.

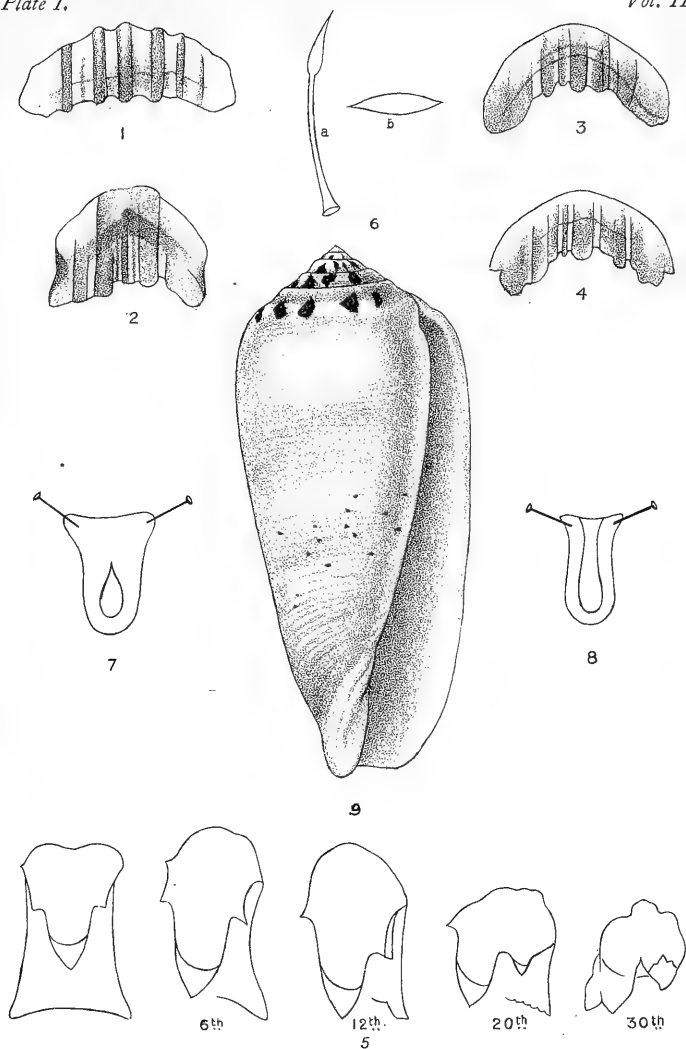
The Chairman and Mr. W. D. Roebuck showed several specimens recently collected at Meanwood near Leeds. This series included *Limax marginatus*, which has not previously been recorded for the Leeds district, *Arion ater* var. *succineus*, *Helix rotundata*, *Zonites fulvus* and *Z. alliarius*.

A number of shells collected by Mr. J. W. Dixon at Bridlington were exhibited, and particulars entered in the Yorkshire Record Book.

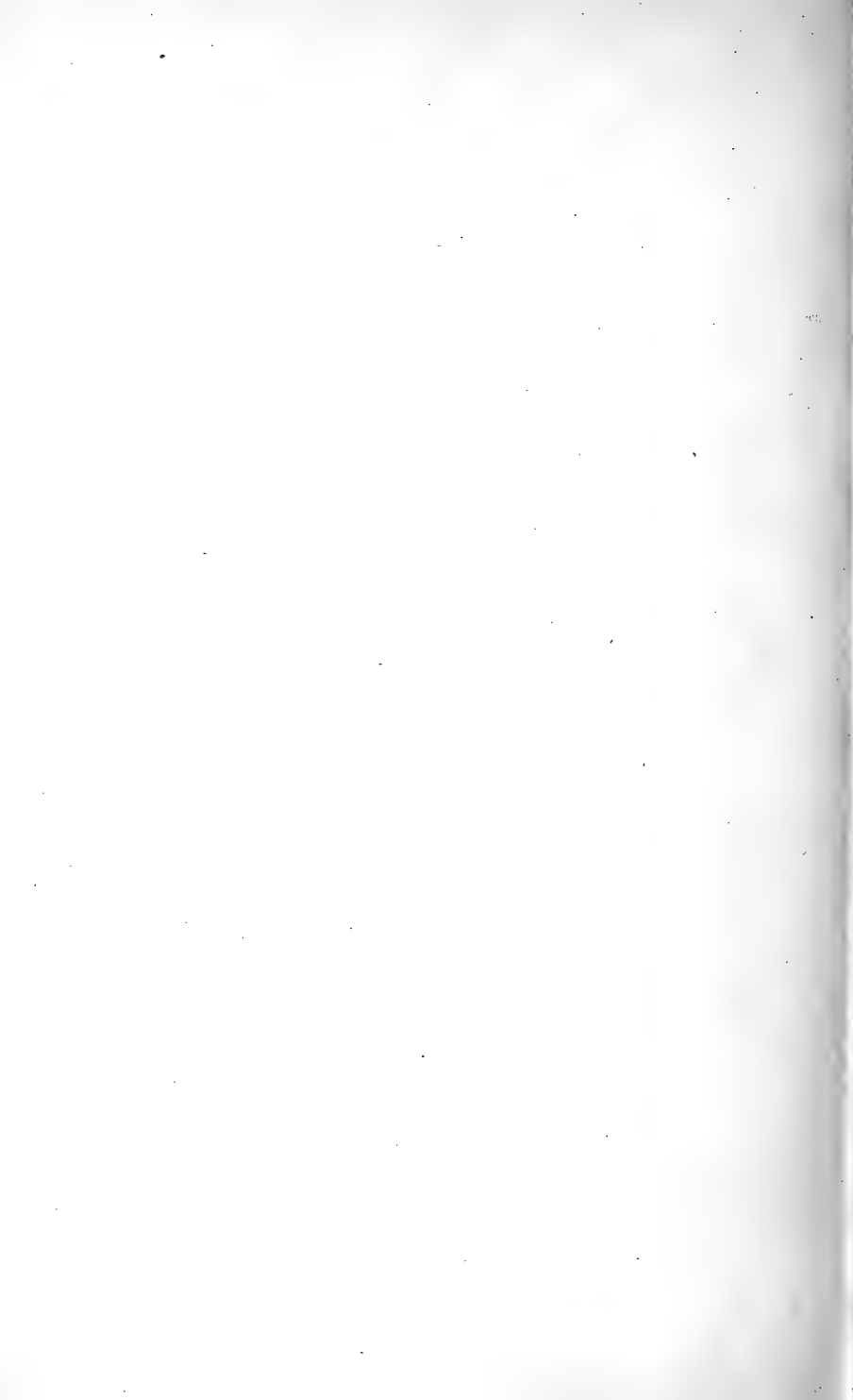
Mr. W. Denison Roebuck showed large collections of shells collected at various localities, whilst on a tour through Wensleydale, Semerdale and Upper Wharfedale. The Wensleydale list contained specimens of *Helix nemoralis*, *H. hortensis*, *H. arbustorum*, *H. hispida*, *H. sericea*, *H. rupestris*, *Clausilia rugosa* var. *dubia*, *Azeca tridens*, *Pupa umbilicata*, *Balea perversa*, *Vitrina pellucida*, *Zonites nitidulus*, *Z. purus*, *Z. purus* var. *margaritacea*, *Z. crystallinus*, *Z. alliarius*, *Limnæa truncatula* and others.

Mr. Thos. W. Bell exhibited shells from Thorpe, Milton, Castor and Halesworth in Northamptonshire. Amongst these were *Helix arbustorum* and varieties *marmorata*, *flavescens* and *pallida*, *H. nemoralis*, *H. hortensis*, *H. hispida*, *H. virgata*, *H. rupestris*, *H. rufescens* var. *albida*, *H. cantiana*, *Clausilia rugosa*, *Zonites crystallinus*, *Z. fulvus*, *Z. nitidulus* and *Vitrina pellucida*.

Limnæa palustris var. **albida** at Lewes.—It may be interesting to your readers to know I took a single specimen of *Limnæa palustris* var. *albida* a day or two ago, on the bank of a stream near Lewes.—C. H. MORRIS, Lewes, Sussex.



Helix arbustorum L.—1 Jaw; 2, 3, 4, other examples. 5, Teeth. 6, *a*, Dart, $\times 6$; *b*, transverse mid-section of head. 7, Dissection of dart-sac, before formation of dart. 8, Dart-sac after shedding dart. 9, *Conus Brazieri* G.B. Sowerby, junr.



No. 1.]

JANUARY, 1880.

[Vol. 3.]

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BOOKS RECEIVED.

- Bulletino della Società Malacologica Italiana, volume V., 1879,
fogli 4, 5, 6. [The Society.]
- Science Gossip for Jan., Feb., March, April, May, June and July,
1879. [The Editor.]
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38, Sep. 22, No. 39, Oct. 6, 1879. [The Editor.]
- Science Gossip for Sep. and Oct., 1879. [The Editor.]
- Collections for a Monograph of Tasmanian Land Shells by W.
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(Read before the Royal Society of Tasmania, Nov. 12, 1878,
with additions to April 10, 1879), Launceston, 1879, 8vo.,
pp. vi. and 55, with folding table. [The Author.]
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vol. xiii., Sep. and Oct., 1879. [The Editor.]
- The Naturalist, edited by C. P. Hobkirk, F.L.S. and G. T.
Porritt, F.L.S., Sep. and Oct., 1879, 8vo. [The Editors.]
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II., part i., January, 1876—June, 1877 (published July 1877).
[The Academy.]
- The same, vol. iii., No. I., March, 1879. [The Academy.]
- Annual Report of the Board of Regents of the Smithsonian
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- Bulletin of the Essex Institute, vol. viii. for 1876, and vol. ix. for
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- Journal de Conchyliologie, edited by MM. Crosse and Fischer,
July, 1879, 92 pages and 3 plates. The Editors.
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- Mollusca of H.M.S. 'Challenger' Expedition.—Trochidæ con-
tinued, viz., the genera Basilissa and Trochus and the Tur-
binidæ, viz., the genus Turbo, by Rev. R. Boog Watson,
B.A., F.L.S.—Extracted from the Linnean Society's Journal,
Zoology, vol. xiv., pp. 692 to 716, June 5, 1879. [The Author.]
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Invertebrata (including Conchology), Ichthyology, Geology,
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- List of Land Shells inhabiting Rurutu, one of the Austral Islands,
with remarks on their synonymy, geographical range, and
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tion of a new species of Goniobranchus, by the same, 8vo.,
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Science Gossip for Nov. and Dec., 1879. [The Editor.]
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- Notes on certain tertiary and post-tertiary deposits on Islands in
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ing Conchology). [The Publisher.]
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Cretaceous Vertebrata, by Prof. E. D. Cope, 4to., pp. 302
and 57 plates. [Prof. Hayden.]
- U. S. Geological Survey of the Territories, vol. vii., "Tertiary
Flora," Leo Lesquereux, 4to., pp. 366 and 65 plates. [Prof. Hayden.]
- U. S. Geological Survey of the Territories, Illustrations of Creta-
ceous and Tertiary plants, 4to., 26 plates. [Prof. Hayden.]
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- U. S. Geological Survey of the Territories, vol. ix., Invertebrate Palæontology, by F. B. Meek, 4to., pp. 629, and 45 plates. [Prof. Hayden.]
- Descriptive Catalogue of the Photographs of the U. S. Geological Survey of the Territories for the years 1869 to 1873 inclusive, by W. H. Jackson, Photographer. [Prof. Hayden.]
- Descriptive Catalogue of Photographs of North American Indians, by W. H. Jackson, Photographer to the Survey. [Prof. Hayden.]
- Sketch of the Origin and Progress of the United States Geological and Geographical Survey of the Territories. [Prof. Hayden.]
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- A Review of the Fossil Flora of North America, by Leo Lesquereux. [Prof. Hayden.]
- Wesley's Natural History and Scientific Book Circular, No. 41. [The Publisher.]
- Papers, Proceedings and Report of the Royal Society of Tasmania, for 1878. [The Society.]
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- Memoirs of the Boston Society of Natural History, vol. iii., part i., No. 2.—The early types of Insects or the origin and sequence of Insect life in Paleozoic times, by S. H. Scudder. On *Distomum crassicolle*, by C. S. Minot. [The Society.]
- Proceedings of the Boston Society of Natural History, vol. xix., part iii. and iv.; vol. xx., part i. [The Society.]
- Bulletin of the Essex Institute, vol. x., Nos. 1-12. [The Institute.]
- Annual Report of the Comptroller of the currency to the second session of the Forty-sixth Congress of the United States. [The Comptroller.]
- On the Mollusca of H.M.S. 'Challenger' Expedition, the Cæcidæ, comprising the genera *Parastrophia*, *Watsonia* and *Cæcum*, by the Marquis de Folin, with a prefatory note by Rev. R. Boog Watson, B.A., F.R.S.E., F.L.S., &c. [Rev. R. B. Watson.]

BOOKS RECEIVED.—Cont.

- Jahrbucher der Deutschen Malakozoologischen Gesellschaft, Jan.
and April, 1880. [Dr. Kobelt.
Thirty-first Annual Report of the Trustees of the Astor Library,
1879. [The Trustees.
Naturæ Novitates, 19-25. [The Publishers
Science Gossip, May and June, 1880. [The Publishers.
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- Tidsskrift for populære Fremstillinger af Naturvidenskaben, udgivet af C. F. Lutken og Eug. Warming, 1ste and 2det Hæfte, 1880. [The Editors.]
- Bulletin of the Geological and Geographical Survey of the Territories.—The So-called Two-ocean Passes, by F. V. Hayden. [The Author.]
- Preliminary report of the Field-work of the Survey for 1878, by Prof. Hayden. [The Author.]
- Fossil Forests of the Volcanic Tertiary formation of the Yellowstone National Park, by W. H. Holmes. [Prof. Hayden.]
- Jura-Trias section of Southeastern Idaho and Western Wyoming, by A. C. Peale, M.D. [Prof. Hayden.]
- Horizons of extinct Vertebrata of Europe and N. America.—
1.—The relation of the Vertebrata of Europe and N. America; 2.—Observations on the Faunæ of the Miocene Tertiaries of Oregon, by E. D. Cope. [Prof. Hayden.]
- Sketch of the Origin and Progress of the U. S. Geological and Geographical Survey of the Territories, by Prof. Hayden. [The Author.]
- Preliminary Report of the Field-work of the U. S. Geological and Geographical Survey of the Territories, for the season of 1877. [Prof. Hayden.]
- The Naturalist, June, 1880. [The Editors.]
- The American Naturalist, June, 1880. [The Editor.]
- Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft, May, 1880, No. 5. [The Editor.]
- Zoologischer Anzeiger, herausgegeben von Prof. J. Victor Carus, Leipzig, No. 57, June 7th; No. 58, June 21st, 1880. [The Editor.]
- Wesley's Natural History and Scientific Book Circular, No. 42. [The Publisher.]
- Proceedings of the Academy of Natural Sciences of Philadelphia, parts 1, 2 and 3, pp. 490 and 15 plates, 1879. [The Academy.]
- Science Gossip, No. 187, July 1, 1880. [The Publisher.]
- Eleventh Annual Report of the U. S. Geological and Geographical Survey of the Territories, embracing Idaho and Wyoming, being a report of progress of the exploration for the year 1877, by F. V. Hayden, 1879, pp. 720, 10 plates and 76 maps. [The Department of the Interior.]
- The Naturalist, edited by C. P. Hobkirk, F.L.S., and G. T. Porritt, F.L.S., No. 60, July, 1880. [The Editors.]
- The American Naturalist, vol. xiv., No. 7, July, 1880, edited by Prof. A. S. Packard, junr. [The Editor.]
- Transaction of the Watford Natural History Society and Hertfordshire Field Club, edited by John Hopkinson, F.L.S., F.G.S., vol. iii, parts 7 and 8, April and June, 1880. [The Society.]

BOOKS RECEIVED.—*Cont.*

- The Popular Science Review, edited by W. S. Dallas, F.L.S.,
No. 15, July, 1880. [The Publisher.
Zoologischer Anzeiger, herausgegeben von Prof. J. Victor Carus
in Leipzig, No. 59, July 5, 1880. [The Editor.
Bulletino della Società Malacologica Italiana, vol. v., fogli 16-18,
1879. [The Society.
Tidskrift for populære Fremstillinger af Naturvidenskaben,
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" " var. " ...	1 6	" argentea (large sp.) "	0 6
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- Memoirs of The Boston Society of Natural History, vol. iii., part i., No. iii., Palæozoic Cockroaches, a complete revision of the species of both worlds, with an essay towards their Classification, by Samuel H. Scudder, pp. 134 and 6 plates. [The Society.]
- Contributions to the Geology of Eastern Massachusetts, by W. O. Crosby, pp. 288, 5 plates and colored geological map. [Boston Society of Natural History.]
- Proceedings of the Boston Society of Natural History, vol. xx., parts ii. and iii., pp. 336 and 3 plates. [The Society.]
- The Transactions of the Academy of Sciences of St. Louis, vol. iv., No. i., pp. 250, 2 plates and photograph. [The Academy.]
- Zoologischer Anzeiger, herausgegeben von Prof. J. Victor Carus in Leipzig, No. 60, 12th July, 1880. [The Editor.]

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Ranella siphonata,0	9	P. mondranii,0	6
Coralliophila neritoides,0	2	Gibbus lyonetianus, Mauritius (this		
Patella chitonoides,0	4	species has totally disappeared in		
P. spinifera,0	3	the Island)1	6
Cyprea cruenta,0	6	Pupa sulcatus, Mauritius	...0	4
Purpura persica,0	4	P. ,(var.)0	4
Conus flavidus,0	6	P. versipolis0	3
C. millepunctatus,0	6	P. teres0	3
Ranella anceps,0	9	P. holostoma0	3
Aplustra aplustre,0	3	Neritina mauritiana, Madagascar	...0	2
Akera soluta,0	5	N. sp. (fine), Mauritius	...0	4
Helix mauritiana (var.),0	3	N. sp. (fine), Madagascar	...0	4
H. inversicolor,0	5	N. longispina, Nauritius	...0	3

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410 Cardium bicolor „o 6	190 Scutellina, sp. „o 2
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Mauritius.....	8 o	161 E. acutao 5
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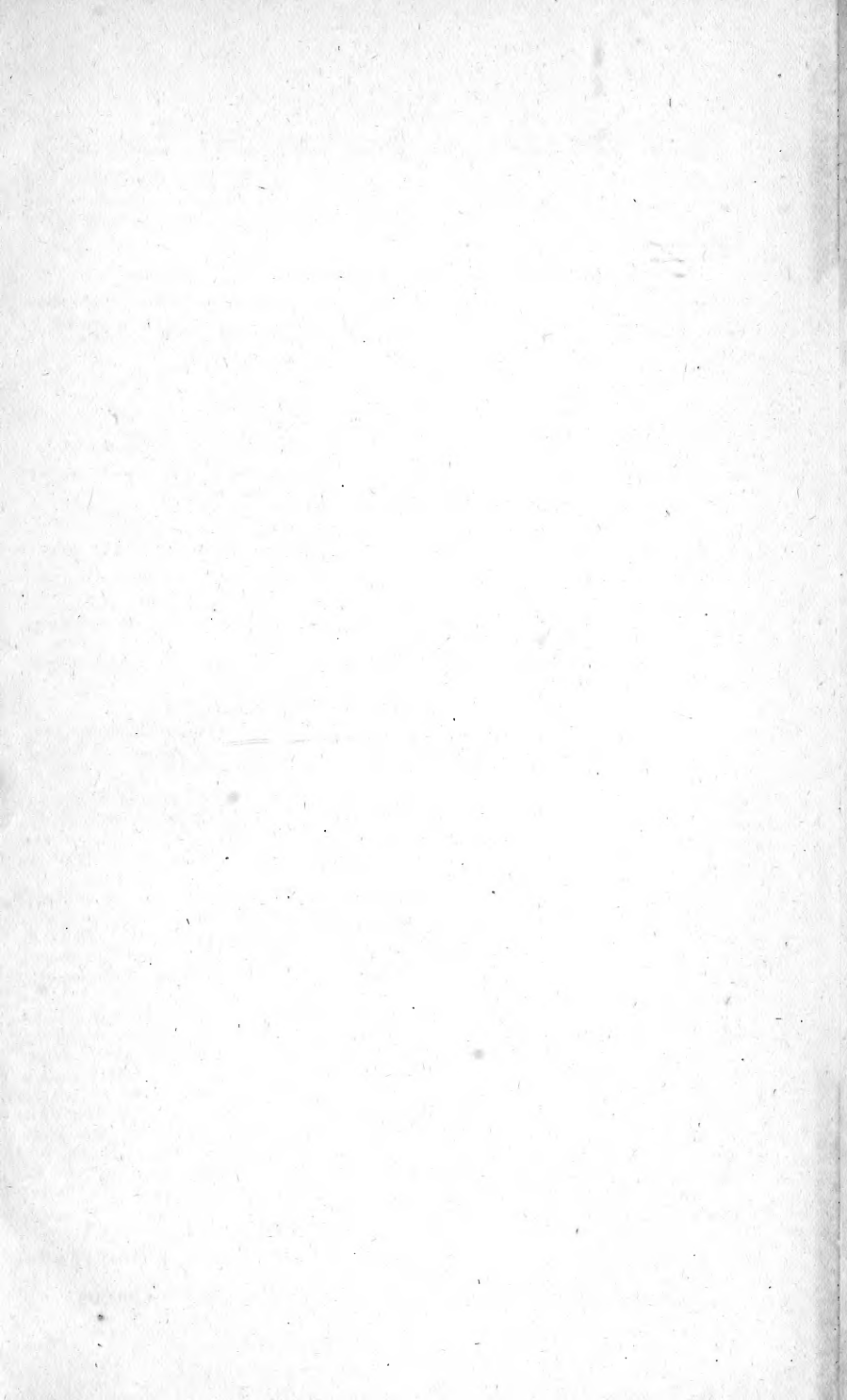
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