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XVI. — *Descriptions of Thirty-four Species of Marine Mollusca from the Persian Gulf, Gulf of Oman, and Arabian Sea, collected by Mr. F. W. Townsend.* By JAMES COSMO MELVILL, M.A., D.Sc.

[Plates IV. & V.]

THE last general descriptive paper, based upon Mr. Townsend's large collections, was published in October 1912*, and since then I have only essayed a revision of the Turridæ (Pleurotomidæ) † as well as the Terebridæ ‡ of the Persian Gulf region, the long continuance of the world-war having naturally prevented much apportionment of time to this task.

But now, with the following thirty-four additions to the fauna, one feels the work is almost completed. The total number enumerated cannot be very far short of two thousand, and this includes, roundly speaking, six hundred new to science. Should circumstances permit, it would be ultimately desirable to give a brief, up-to-date catalogue of the whole series, with "addenda, emendanda, and corrigenda." Doubtless several omissions have occurred, some due to inadvertence, others through paucity of material or poor condition of specimens.

* Proc. Malac. Soc. Lond. vol. x. 1912, p. 240 *sqq.*

† *Ibid.* vol. xii. 1917, pp. 140-201.

‡ Journ. of Conch. vol. xv. 1917, pp. 188 & 204.

In the following pages I am much indebted to Mr. J. R. le Brockton Tomlin for valuable opinions and assistance; likewise to Messrs. G. B. Sowerby, Hugh Fulton, and R. Standen. To Mr. Bernard Lucas also I am considerably under obligation for having sorted much shell-sand for me, more particularly from the very prolific sounding made in the Gulf of Oman at 156 fathoms, so often referred to in these papers; and, finally, I must congratulate Miss Gertrude Woodward on the two successful Plates accompanying these descriptions.

Bursa gnorima *, sp. n. (Pl. IV. fig. 1.)

B. testa ovato-fusiformi, spira abbreviata, apice obtuso, varicibus rotundatis; anfractibus ad 7, quorum tres apicales, læves, globulares, cæteris suturaliter impressis; supra medium angulosis, undique arcte et delicate spiraliter granulosis, linea transversali subgranata alternante, granulis nitidis, supra medium, ad angulum, multum fortioribus; superficiei pallide straminea; apertura ovata, alba; peristomate incrassato, albo, nitido, simul ac columella, intus multilirata; canali paulum recurvo, brevi.

Long. 43, lat. 27 mm.

Hab. Jask, Gulf of Oman.

It is with some diffidence that I have ventured to introduce another species into a well worked-out and circumscribed genus; but this shell, of which I have seen a few specimens in no way differing from each other, possesses distinctive attributes, the nearest ally seeming to be the West-American *B. crassa*, Desh., and I consider it closely comparable with no Eastern species. It is pale straw-coloured, neatly formed and compact, varices somewhat rounded; upper whorls attenuate, body-whorl uniformly finely granose, spirally, with interstitial liræ, partly granulose likewise; above the centre of the whorl a single spiral line of much larger tubercles surrounds it, and just below the sutures short longitudinal plaits extend some way towards this line; the labrum is shining white, columella lirate, also white; mouth ovate, canal short, very slightly curved. At first considered a small variety of *B. subgranosa* (Sowb.), I am obliged to Mr. Hugh Fulton for having directed my attention to this species and giving me his opinion thereupon.

* γνώριμος, distinguished.

*Alectryon (Phrontis) alcimus**, sp. n. (Pl. IV. fig. 2.)

A. testa ovato-fusiformi, solida, alba, brunneo-lineata et hic illic variegata; anfractibus 8, quorum tres minuti, apicales, vitrei, læves, cæteris ad suturas gradatulis, longitudinaliter crassicostratis, et spiraliter sulcatis, sulcis anfractum apud ultimum circa 12, costis infra, juxta suturas, nodulosis, spiraliter brunneo-zonatis, et maculato-lineatis; apertura ovata, labro incrassato, albo, lævi, paullum effuso, intus multilirato; columella callosa, alba, nitida, excavata.

Long. 15, lat. 8 mm.

Hab. Mekran Coast.

This very select species may be a local variety of *Nassa nodicostata*, H. Adams, but differs from specimens in my collection so named by Mr. F. P. Marrat. It evidently comes nearest this species, but appears smoother than the Philippine Island type collected by Mr. H. Cuming and figured by Reeve. There has been some confusion between this shell and the similarly named *Nassa nodicincta*, Adams. This is an entirely different species, of the Western Hemisphere, though equally nodose below the sutures of the various whorls. I have it from the Galapagos Isles.

Alectryon (Hima) gwatkinianus, sp. n.
(Pl. IV. fig. 4.)

A. testa ovata, cinerea, circa aperturam brunneo-tincta; anfractibus 8, quorum 3 apicales subhyalini, fusci, cæteris apud suturas impressis, ventricosulis, spiraliter arcte noduloso-liratis, et longitudinaliter decussato-costulatis, costulis obliquis, interstitiis planatis, quadratis; apertura fere rotunda, labro effuso, intus multilirato, columella multum excavata, versus basin truncatula, canali lato brevissimo.

Long. 20, lat. 11 mm.

Hab. Persian Gulf.

This interesting "*Nassa*" is the Eastern analogue of the Californian *perpinguis*, Hinds, which in most ways it very closely resembles. It is, however, of slightly thicker substance and the columella more strongly excavate. A chestnut spiral band, ornamenting the whorls, likewise exists in the American species, but is absent in ours. Having received this shell from the late Rev. Professor Henry Melvill Gwatkin, as received by him direct from Mr. Townsend, I have pleasure in connecting with it the name of a friend of long standing, and

* ἀλκιμος, stoutly-fashioned, strong.

one distinguished in many realms of thought and learning, whose relaxation it was to turn from the study of the Early Christian Fathers and deep Biblical lore *, to such successful research in Molluscan radulæ that his name soon became a household word for accurate and discerning knowledge in this branch of the science, his loss being generally felt to be quite irreparable. After a short illness, he passed away at his Cambridge residence in November 1916, aged 73.

Alectryon † (*Hima*) *protrusidens*, sp. n.
(Pl. IV. fig. 3.)

A. testa ovato-fusiformi, solida, albo-ochracea; anfractibus 8, quorum 3 apicales, duo superni minuti, tertius vitreus, globulosus, lævis, cæteris nequaquam suturaliter impressis, undique arcetissime longitudinaliter noduloso-costulatis, et spiraliter sulcatis, nodulis apud suturas majoribus, conspicuis, ochraceo-tinctis, superficie ad medium pallidior; apertura parva, ovata, labro, simul ac columella, paullum incrassatis, labro intus 5 denticulo-lirato, quorum denticulus secundus et quintus majores, protrudentes, margine columellari versus basin obscure bilirato, excavato.
Long. 12, lat. 5 mm.

Hab. Karachi.

This small species, compact, solid, hardly suturally impressed, ochreous-banded spirally below, longitudinally closely nodoso-costulate, and transversely closely decussato-sulcate, possesses a distinction in the protrusive character of two of the five lirate denticulations of the inner side of the lip.

Pisania townsendi, sp. n. (Pl. IV. fig. 5.)

P. testa attenuato-fusiformi, gracili, uniformiter straminea; anfractibus 8, quorum duo vitrei, læves, cæteris suturaliter multum impressis, ventricosis, centraliter paullum angulosis, longitudinaliter obtusi-costatis; anfractus ultimi numero 12, undique pulcherrime spiraliter liratis, circa 24-25; apertura oblonga, angusta, labro recto, intus multilirato, columella recta, canali lato, paullulum recurvo.
Long. 22, lat. 8 mm.

Hab. Karachi.

* Professor Gwatkin was long "Dixie Professor of Ecclesiastical History" at Cambridge University. In 1867 he passed first class in the Mathematical, Classical, and Theological Tripos, as also in that of Moral Science—an almost unique record.

† We spell the Montfortian name, presumably derived from ἀλεκτρυών, a cock, with a "y" in preference to "i", to conform to the rule of nomenclature which holds that the Greek "upsilon" equals the Latin "y."

A little like *P. crocata*, Reeve, in form, but in this species the whorls are far more angular and echinate. From *P. gaskelli**, Melv. (= *neglecta*, Sowb.), it differs in much finer and more frequent spiral liration, the interstices in both species being spirally striate but much finer in character, and as 4 to 2 in *townsendi* compared with *gaskelli*. General form identical.

We dedicate this most interesting species to its discoverer, and I am indebted to Mr. G. B. Sowerby for calling my attention to it and confirming my view that it needed description.

Mitra vaticinator †, sp. n. (Pl. IV. fig. 6.)

M. testa oblongo-fusiformi, solidula, straminea, infra suturas et centraliter floccis albis variegata; anfractibus ad 8, subgradatis, suturaliter vix impressis, undique acutissime regulariter sulcis spiralibus præditis, longitudinaliter decussato-cancellatis, ultimo anfractu cæteris magnopere exæquante; apertura angusta, oblonga, labro paullum effuso, columella quadriplicata, subobliqua. Long. 26, lat. 10 mm.

Hab. Persian Gulf, off Muscat, Arabia.

I have, in company with the late Mr. Edgar Smith, compared this species with its near allies, when we considered that it differed from all others. In size it comes nearest to *M. guttata*, Sw., and in general appearance is similar to that species, but the decussate cancellation is here much finer and more regular. Likewise, in *guttata* the spiral lines are somewhat distant. In *M. solida*, Reeve, found in the region we are treating of by Mr. Townsend, the whorls are more tumid and the sutures deep. In the larger and coarser *M. ambigua* and *fulva*, both of Swainson, the build of the shell is the same, but the details coarser and cancellation absent. *M. floccata*, Rve., is allied in the character of its marking, as its name would imply, but here, again, the somewhat ventricose whorls and the sutural arrangements differ.

Mitra (Pusia) iteïna ‡, sp. n. (Pl. IV. fig. 7.)

M. testa ovato-oblonga, solidula, albo-straminea; anfractibus ad 11-12, ad suturas impressis, undique acutissime costulatis, et spiraliter cancellatis, interstitiis quadratis, ultimo anfractu infra

* Journ. of Conch. vi. 1891, p. 406, pl. ii. fig. 5.

† *Vaticinator*, a seer or prophet.

‡ *iteïnos*, basket or osier-work.

suturas stramineo, infra peripheriam fusco-zonato, versus basin spiraliter noduloso; apertura oblonga, labro paulum incrassato, columella 5-plicata, fere recta.

Long. 23, lat. 8.75 mm.

Hab. Persian Gulf, Henjam Island, 10 fathoms.

Allied to this little species are those of the group of which *M. multicostata*, Sw., may be taken as an exponent. It is much narrower in form than this species, the beautiful shining riblets and decussating cancellations so regularly disposed, with the white stramineous and fuscous zoned spiral bands, serving to characterize it. *M. sculptilis*, Reeve, is of somewhat similar build, but here the interstices alone are latticed, the ribs remaining clear. In *iteina* there is complete cancellation, and the same obtains in *M. dardala*, Rve.

Lamellaria (Chelynotus) berghi, Desh.
(Pl. IV. fig. 8.)

Lamellaria berghi, G. P. Deshayes, Moll. de Réunion, 1863, p. 77, pl. ix. figs. 18-20.

I figure what appears to be a non-adult form of *berghi*, Desh., a most fragile, delicate, vitreous shell, with bluish tinge, perfectly translucent, apex mamillate, very minute, measuring alt. 9, diam. 8 mm. So many endemic species or forms, closely allied to and yet specifically distinct from others ranging further south, have been recently discovered in what might be termed the "cul de sac" of the Persian Gulf, that it is quite possible that, when mature, this may present characteristics for differentiation; but, at all events, it being the first time a member of this group has been reported from these seas, a record of its occurrence is interesting. A very few examples were collected, all live shells, similar in size and all other respects. No exact locality is given otherwise than "Persian Gulf."

*Melanella lampra**, sp. n. (Pl. IV. fig. 9.)

M. testa parva, attenuata, delicata, pellucida, pallide olivacea, lævi; anfractibus 11, ad suturas impressis, ventricosulis, perlævibus, diaphanis, ultimo tres anfractus approximatos exæquante, versus basin leniter declivi; apertura oblonga, labro haud effuso, recto, margine columellari obliquo, simplice.

Long. 6, lat. 1.50 mm.

Hab. Persian Gulf, probably off Shaikh-Shuaib Island.

* λάμπρος, shining.

A very delicate pellucid Eulimoid, as the specific name chosen denotes. It indeed seems fatuous to be now compelled to group the members of this genus of ivory whiteness and delicacy under a name so ill-chosen, and suggestive of Cimmerian darkness!

Mucronalia aethria *, sp. n. (Pl. IV. fig. 10.)

M. testa parva, perlævi, diaphana, nitidissima, oblongo-fusiforimi; anfractibus ad 12, quorum apicales 2 simpliciter heterostrophi, his 3 proximis attenuato-caudatis, cæteris ad suturas vix impressis, leniter accrescentibus, ultimo longitudine tres approximatos anfractus æquante; peristomate tenui, columella obliqua, apertura ovato-oblonga.

Long. 5, lat. 1.50 mm.

Hab. Persian Gulf, Henjam Island, 40 fathoms, 1906.

This *Mucronalia* is a plain, extremely smooth and shining little species, hardly impressed suturally, the upper whorls much narrowed and slightly caudate, while the nuclei are heterostrophe. Three other species are found in these seas, as follows:—

M. bizonula, Melv. Proc. Malac. Soc. vii. 1906, p. 73, pl. vii. fig. 8.—A minute twice-banded species, found in the Gulf of Oman at 156 fathoms and since recorded by Mr. C. Hedley † from Mast Head Reef, Queensland, 17–20 fathoms.

M. lepida, Melv. *ibid.* p. 72, pl. viii. fig. 31.—An ovate, small form from the same locality. Entirely white and semi-pellucent.

M. oxytenes, Melv. *ibid.* vi. 1904, p. 163, pl. x. fig. 13.—Larger than the last in all its parts. Also from the Gulf of Oman, dredged from deep water.

Turbonilla exilispira ‡, sp. n. (Pl. IV. fig. 12.)

T. testa alba, minuta, perattenuata, semipellucente; anfractibus 13, quorum 3 apicales, valide heterostrophi, cæteris angustis, ad suturas impressis, arcte oblique costulatis, costulis ad basin evanidis, interstitiis lævibus, ultimo vix latiore; peristomate recto, tenui, apertura squarrosula, columella recta.

Long. 4, lat. .75 mm.

Hab. Karachi.

Almost as narrow as *T. angustissima* §, Melv., from the

* *αἰθρῖος*, clear, bright.

† Proc. Linn. Soc. N.S.W. 1907, vol. xxxii. p. 505.

‡ *Exilis, spiræ*, with slender spire.

§ Proc. Malac. Soc. vol. vi. 1904, p. 55, pl. v. fig. 13.

Gulf of Oman, 156 fathoms, with which alone it seems comparable, this little species can easily be recognized by its pinched form, its straight peristome and squarrose aperture, and longitudinal oblique riblets far more close and numerous than obtain in its ally. Both have similarly constructed apical whorls. It only occurred very rarely at the above locality.

Turbonilla patruelis, sp. n. (Pl. IV. fig. 13.)

T. testa minuta, gracili, subpellucente, attenuata, nitida; anfractibus ad 14, quorum 3 apicales valide heterostrophi, cæteris suturaliter impressis, ventricosis, longitudinaliter arcte costulatis, interstitiis sub lente spiraliter multistriatis, ultimo anfractu ad medium leuiter castaneo-zonato, costulis rectis; apertura parva, peristomate tenui, columella fere recta.

Long. 5, lat. 1.25 mm.

Hab. Gulf of Oman, Charbar, 5 fathoms.

Resembling *T. materna*, Melv., but moulded upon an altogether smaller and more delicate scale, the whorls being semipellucid, as opposed to the opaque white of the more solid *materna*, while the longitudinal riblets are proportionately more frequent. Around the centre of the riblets runs a very faint spiral chestnut band or line. In this particular it is comparable with *T. uncinata*, Melv., than which it is thinner and smaller and more multicostate.

Turbonilla thryallis *, sp. n. (Pl. IV. fig. 14.)

T. testa candida, compacta, nequaquam pellucida, lævissima, attenuata; anfractibus ad 15, quorum apicales 2-3 incumbenti-heterostrophi, ventricosis, ad suturas multum impressis, arcte longitudinaliter recte costulatis, costulis, simul ac interstitiis, perlævibus, numero anfractum apud ultimum 27, ad basin evanidis; peristomate tenui, columella recta, apertura angusta, squarrosula.

Long. 7, lat. 1.75 mm.

Hab. Gulf of Oman, Charbar, 40 fathoms.

A very neat and elegant species, pure opaque milky-white, exceedingly smooth and shining throughout, with impressed sutures and ventricose whorls, the longitudinal riblets being close and numerous—twenty-seven may be counted on the body-whorl. Labrum and columella straight, mouth quadrate and narrow.

* *θρύαλλis*, white pith or wick of a candle, from the fancied resemblance.

Allied most nearly to the much larger *T. candida*, Ad., and also to *T. materna* and *unicincta*, Melv. From the last of these it differs in more frequent costulations and absence of any spiral coloured band; from *materna* in greater delicacy of substance, and also in the straight smooth riblets being closer and almost double in number.

*Turbonilla umbrina**, sp. n. (Pl. IV. fig. 11.)

T. testa attenuata, solidula, compacta, sordide brunnea, lævi; anfractibus 15-16, inclusis apicalibus heterostrophis, omnibus ad suturas impressis, undique arcte costulatis, costis crassis, rectis, interstitialiter superficie lævi, ultimo anfractu infra peripheriam lævigata, costis evanescentibus; apertura fere rotunda, parva, labro vix effuso, columella recta.

Long. 8, lat. 1.75 mm.

Hab. Karachi, 1906.

A somewhat coarsely built *Turbonilla*, of a dull brown colour throughout; whorls fairly impressed suturally, longitudinal riblets frequent, straight, close, interstices quite smooth; mouth, proportionately speaking, small, roundish, columellar margin straight, outer lip hardly effuse. It was very rare at the above locality.

Eulimella squarrosula, sp. n. (Pl. IV. fig. 16.)

E. testa alba, delicata, tenui, anguste fusiformi, versus apicem paullum caudata; anfractibus ad 14, quorum apicales 3 valide heterostrophi, cæteris paullulum ad suturas impressis, lævissimis, sub lente longitudinaliter albo-strigatis, ultimo anfractu duos proximos longitudine exæquante; apertura squarrosa, peristomate tenui, columella fere recta.

Long. 4.50, lat. 1 mm.

Hab. Persian Gulf, Mussandam, 55 fathoms.

A species plain in form, hardly impressed suturally; whorls smooth, straight; mouth square, outer lip and columella nearly straight. This differs from all the eight species hitherto included in this fauna, perhaps coming nearest to *E. venusta* †, Melv., distinguished by its elegant pagodiform whorls.

* *Umbræ*, shade, from the dusky colour.

† Proc. Malac. Soc. vol. vi. 1904, p. 56, pl. v. fig. 15.

Styloptygma clymene *, sp. n. (Pl. IV. fig. 15.)

S. testa parva, tenui, alba, perlævi, elongata, supra brevicaudata; anfractibus ad 9, quorum apicales duo laterali-heterostrophi, cæteris ad suturas impressis, pernitidis, ultimo $\frac{1}{3}$ longitudinis totius æquante; apertura parva, ovato-rotunda, labro recto, columella fortiter uniplicata.

Long. 5, lat. 1.25 mm.

Hab. Persian Gulf, Mussandam, 55 fathoms.

A somewhat stouter species than the allied *S. cometes*, Melv., which is more caudate, and subpellucid. I think it is right to place it in the same genus; by some it might be included in *Syrnola*.

Cingulina secernenda, sp. n. (Pl. IV. fig. 17.)

C. testa minuta, attenuata, oblonga, alba; anfractibus ad 9, quorum tres apicales, heterostrophi, læves, lacteo-vitrei, cæteris undique uniformiter arcte spiraliter carinatis et tornatis, carinulis rotundatis, interstitialiter sub lente alveolatis, supernis duabus, ante et penultimo tribus, ultimo septem carinulis præditis; apertura oblongo-ovata, peristomate paullulum incrassato, albo, columella omnino simplice.

Long. 3.50, lat. 1 mm.

Hab. Karachi.

Very like, superficially, to *Oscilla indica*, Melv., but wanting the columellar plait.

An *Oscilla* occurred, likewise, on the telegraph-cable in the Gulf of Oman, at 43 fathoms, resembling this species, but more elongate than *O. indica*, with the same character of tornate whorl ornamented with spiral carinæ, columella strongly once-plicated; long. 4.75 mm. This we have placed with our *O. faceta* †, as probably exemplifying the adult state of that species. The mouth, however, is smaller and rounder, and there are other slight differences; but nothing can be decided till more specimens are obtained.

* *Clymene*, a Nereid, daughter of Oceanus and Tethys, and mother of Phaeton.

† Journ. of Malac. vol. xi. 1904, p. 82, pl. viii. fig. 10.

RISSOINA, d'Orb., 1840.

§ CHILIOSTIGMA, subgen. nov.

Rissoina refugium, sp. n. (Pl. V. fig. 20.)

R. testa isosceliformi, supra attenuata, alba, nitida, solidula; anfractibus ad 11, apicalibus lævibus, nitentibus, cæteris suturaliter impressis, ventricosulis, undique arcte et minute longitudinaliter striato-liratis, striis paullum obliquis, interstitiis regulariter et arctissime spiraliter puncturatis, punctis minutis, ultimo anfractu infra peripheriam curto, abbreviato; peristomate albo, incrassato, lævi, subtriangulari, paullum effuso, fere continuo, ad basin compresso, crassiore; columella obliqua, apertura subovata.

Long. 12, lat. 4 mm.

Hab. Gulf of Oman, lat. 24° 50' N., long. 56° 54' E.; 156 fathoms.

A remarkable species, which seems worthy of separate subgeneric rank, coming, it is true, near certain members of subgen. *Zebina* or *Zebinella*, but differing in the close longitudinal striation and interstitial close spiral pitting, the puncturations being very regular and minute. From these circumstances I propose the subgenus *Chiliostigma* *.

The nearest approach I can find in this large genus to our species is *R. mottezi*, Bavay †, from Jamaica, very recently described. I have only seen figure and description. It is more decidedly costulate, but the deep spiral pitting is represented, and I would consider it to belong to the same new subgenus.

Amphithalamus psomus ‡, sp. n. (Pl. V. fig. 19.)

A. testa minuta, oblonga, solidula, fusca; anfractibus 5, quorum apicalis minutus, cæteris arctissime spiraliter striatis, ultimo paullum elongato; apertura subrotunda; peristomate fere continuo, læte fusciscente, nitido, paullum expanso; columella simplice.

Long. 3.25, lat. 1.75 mm.

Hab. Mekran Coast, near Gwadâr.

A very small, dark brown shell, with slightly expanded and reflected lip, very closely microscopically spirally striate throughout. It has several allies in this region—*columen*,

* χίλιος, στίγμα, thousand-pitted.

† Journ. de Conch. 1917, p. 107, pl. iii. fig. 15.

‡ ψώμος, a morsel or tit-bit.

aristæi, *elspethæ*, and others. It differs from all in its compact form, brown colour, and slightly expanded lip.

Fossarus eutorniscus *, sp. n. (Pl. V. fig. 21.)

F. testa perminuta, solidiuscula, sordide straminea, ovata; anfractibus 4, quorum duo apicales bulbosi, albi, lævissimi, penultimo 2-ultimo 5-carinato, videlicet, carina prima infra, juxta suturas, secunda et tertia ad peripheriam, quarta et quinta circa umbilicum versus basin, interstitiis spiraliter minute ad profunde punctatis, umbilico anguste profundo; apertura rotundata; peristomate incrassato, rotundo, continuo; margine columellari simplice.

Alt. 1.50, diam. 1.50 mm.

Hab. Karachi.

Probably the smallest species of the genus, of which we have only seen five or six examples, varying very slightly in size. Though so minute, the sculpture is most elaborate, especially of the body-whorl, which possesses five spiral keels, the first just below the sutures, second and third at the periphery, fourth and fifth round the umbilicus; these keels are very incrassate, proportionately speaking, and the interstitial spaces between the second and third and fourth and fifth keels are spirally, regularly, deeply punctate. Of the same general form as *F. elegans* †, Verrill & Smith, from U.S.A. Atlantic Coast, but much smaller.

Fossarus (Couthouyia) cancellarius, sp. n.
(Pl. V. fig. 22.)

F. testa parva, alba, tenui, ovato-oblonga; anfractibus 6, quorum apicales 2 vitrei, læves, mamillati, cæteris 4, ad suturas multum impressis, ventricosulis, undique minute et pulcherrime regulariter cancellatis, interstitiis quadratulis, ultimo anfractu cæteros permultum exsuperante; umbilico perparvo, angustissimo; apertura ovata, peristomate tenuissimo, fragili, columella simplice, obliqua.

Long. 3.50, lat. 2 mm. (sp. max.).

Hab. "Persian Gulf."

A very fragile, delicate shell, six-whorled, these being swollen and ventricose, the whole surface beautifully minutely cancellate; outer lip thin, slightly effuse; aperture oval,

* εὐ τὸρνίσκος, well-turned.

† Trans. Connect. Acad. v. p. 522, pl. xlvii. fig. 38 (1882).

umbilicus very small and narrow, columella oblique. The nearest approach to this may be *F.* (*Couthouyia*) *obtusa*, A. Ad., from California, by some authors deemed an *Isapis*; but this is a far coarser species in character and build. I possess a large series of this and allied genera, very many yet unnamed, and neither among these nor yet in the British Museum have I been able to find its match.

Triphora incolumis, sp. n. (Pl. IV. fig. 18.)

T. testa cylindrico-fusiformi, pallide straminea, solidula; anfractibus 16-17, quorum apicales 5 pulchre et minute longitudinaliter striati, paullum decussati, apice ipso lævi, deplanato, cæteris ad suturas profunde impressis, lateribus paullulum convexis, quatuor supernis bi-, his proximis triseriatis, ordinibus nodulato-gemmatis decoratis, ultimo anfractu serie quarta prædito, gemmis interdum versus basin evanidis, circa basin tribus liris succinctis; apertura quadrata, peristomate tenui, canali brevi, paullum recurvo.

Long. 10, lat. 3 mm.

Hab. Persian Gulf: Fao Cable, and along the north coast; not rare.

A fine species, of pronounced character. Cylindro-fusiform in shape, with channelled sutures, whorls (including the five nuclear, three of which are very finely striate) 16-17 in number, the lower whorls all ornamented with three equal spiral regular rows of gemmæ, shining, round, large proportionately; the body-whorl possessing four, the lowest of them sometimes has the gemmæ partly evanescent, the base being encircled with spiral plain ridges. Aperture somewhat squarrose, peristome thin, canal shortly recurved, pronounced. It may be compared with *T. rufula*, Watson, a somewhat smaller species* (long. 7.5 mm.) from Wednesday Island, Torres Straits. This is much of the same sculpture, with channelled suture, the shell being of a ruddy yellow tint throughout. It differs from *T. idonea*, M. & St., not only in the channelled sutures and greater breadth of contour, but in the mouth being more contracted. We have seen a live albino form from Fao; in this the fourth row of noded gemmæ at the periphery of the basal whorl is extremely distinct and perfect.

* 'Challenger' Exp. xv. p. 566, pl. xlii. fig. 2.

Triphora interpres, sp. n. (Pl. V. fig. 23.)

T. testa elegantula attenuato-fusiforimi, gracili, cinerea; anfractibus ad 20, quorum 5 apicales, apice ipso pallide fusco, lævi, his proximis pulchre cancellatis, ochraceo-fuscis, cæteris leniter et anguste ad suturas impressis, lateribus fore rectis, tribus spiraliū gemmularum ordinibus arcte et regulariter præditis, ordine medio minorum, superficie hic illic castaneo-tessellato, ultimo circa basin bilirato; apertura parva, semicirculari, canali conspicuo, brevi, recurvo.

Long. 11, lat. 2.25 mm. (sp. max.).

Hab. Persian Gulf, Mussandam, 55 fathoms.

A rare species, very gracefully attenuate, many (20 or more) whorled, the apical being five in number, ochreous-brown and finely cancellate in young specimens, but soon getting worn, the remainder slightly impressed suturally, with three spiral bands of gemmuled nodules, those on either side of the sutures being the largest and most pronounced, the median row smaller; the body-whorl has but three gemmuled rows in all the examples we have examined, the fourth row, at the periphery, being a simple ridge. The colour is ashy-white, flecked with pale chestnut dashes over the whorls at certain intervals. Mouth small proportionately, semicircular; peristome thin, canal short, recurved.

* * * *

In the former enumeration of the species of this genus occurring in the Persian Gulf area five only are mentioned, viz. :—

T. acuta (Kien.),
T. cingulata (A. Ad.),
T. corrugata (Hinds),
T. idonea, M. & St.,
T. perversa (L.).

Of these, *acuta*, Kien., we have identified with the aid of specimens in the British Museum, assisted by the excellent figure in 'Coquilles Vivantes.'

It is common at Karachi, and known by the dark brown spiral zone of gemmuled nodules at the sutures. A small species; may possibly be an extreme form of *perversa*.

This last-named is protean, and of extremely wide distribution. We have examined two or three hundred examples at least, and find it impossible to get a definite grasp of any essential distinctive character. Mr. le Brockton Tomlin

kindly gave me his opinion on the subject—that it was unlikely that the Gulf fauna contained a single species found in the Mediterranean; but since we hear of *perversa* occurring on the Pacific coast, in West America, we dare not accept this theory as completely valid, and prefer to leave the name unaltered. One interesting form of this mollusc inhabiting the coast near Karachi is larger than the normal type which so commonly extends from Bombay northwards, and measures long. 9, lat. 2 mm.; whorls 15, nuclear small, slightly caudate; whorls impressed suturally, of the usual pattern, 3-seriate, with spiral small gemmulate nodules; colour pale stramineous, nuclear whorls pure white; body-whorl four-rowed, two raised ridges around the base. A narrower shell than *incolumis*, and not so gracefully attenuate as *interpretes*. To this variety of *perversa* the name *persica* might be attached.

T. idonea, M. & St., is a white chalky shell, of deep water. It has not occurred plentifully, and perhaps comes nearest to *interpretes*.

T. corrugata, Hinds, is, next to the ordinary form of what we still call *perversa* (L.), the most abundant and striking of the Gulf *Triphorce*. It is found all along the coast, and with it we now merge what was erroneously called *cingulata* in our first Catalogue.

To these *T. concatenata*, Melv., a small, very attenuate species, has been added, and the occurrence of *T. concors*, Hinds, been noted. Therefore, including the two new species *incolumis* and *interpretes*, eight species of this genus are now recorded, of which, so far as is known, three are endemic in these seas.

Leptothyra miltochriza *, sp. n. (Pl. V. fig. 24.)

L. testa solidâ, suborbiculari, fulvo-rubescente; anfractibus 5, quorum tres apicales, læves, albi, cæteris duobus undique arcute spiraliter liratis, liris uniformibus; apertura rotunda; peristomate crassiusculo nitido, albo, simul ac margine columellari; umbilico anguste sed profundo, cujus margine nequaquam crenulato.

Alt. 3.75, diam. 4 mm.

Hab. "Persian Gulf," probably off Henjam Island.

A small, solid, orbicular, reddish-yellow species, with shining white peristome and columella surrounding its circular aperture; margin of the deep but narrow umbilicus not, as is so often the case, crenulate, but quite simple. The

* *μιλτόχριστος*, in allusion to the red-ochre colour.

whole surface of the two lower whorls is closely spirally lirated. Allied to *L. rosea*, Pilsbry, from Japan, but smaller.

Exclusive of this new species, five others of this genus have, so far, been reported from this region, viz. :—

1. *L. filifera*, Desh.

This needs further investigation. I cannot find any specimens in the collection so named, as I understand, by the late Mr. E. A. Smith.

2. *L. lactea*, Montr. = *costulosa*, G. B. Sowb.

In three or four dredgings in Gulf of Oman.

A very prettily painted shell, depresso-discoid in form, spirally closely lirated, variegated with rose-coloured spots radiating round the surface. Also a New Caledonian species.

3. *L. munda* (H. Adams) COLLONIA; Sowerby, *Thes. Conch., Turbo*, pl. xiii. fig. 163.

Persian Gulf.

Very minute.

4. *L. pilula*, Dunker.

Maskat (Muscat) and Charbar, 5–6 fathoms. Also Bahrein, and in two or three soundings, Gulf of Oman.

A heavily built little round shell, with shouldered whorls, and buff or cinereous spiral spotting and blotches on a dull white ground. Umbilicus margin coarsely crenulate.

5. *L. rubens*, Melv. & Stand.

Persian Gulf, Mussandam, 30 fathoms; live examples. Also at 60 and 156 fathoms in the Gulf of Oman.

A somewhat smooth, angled species, shining, reddish in colour, very abundant at 156 fathoms, rarer at a less depth.

Others very possibly occur. The species are hard to discriminate, and may vary more in sculpture and colouring than is supposed to be the case.

The genus is mostly Eastern, but several striking species occur in the Sandwich Isles and western coasts of America.

*Minolia charmosyne**, sp. n. (Pl. V. fig. 25.)

M. testa gradata, conica, solidula, tornata, fusco-variegata; anfractibus sex, quorum duo albi, minuti, apicales, læves, cæteris infra suturas acute carinatis, supernis una, ultimo anfractu duabus carinis prædito, inter has spiraliter unilirato, simul ac ad basin et circa umbilicum profundum, sed angustum, multis liris decorato, interstitialiter minute longitudinaliter tenuiter rugosistriatulo; apertura rotunda, peristomate tenui, columella paullulum reflexa.

Alt. 5, diam. 4 mm.

Hab. Karachi.

A little, prettily variegated and acutely tornate *Minolia*, of which we have also seen an albino variety which might be termed var. *albinella*. The upper whorls are smooth, the body-whorl alone showing very fine longitudinal striæ interstitially, while round the narrow but deep umbilicus this is more pronounced, causing a delicately shagreened appearance; the spiral liræ here are three or four in number, and four between the periphery and the base.

Minolia (Conotrochus) eutyches †, sp. n.
(Pl. V. fig. 26.)

M. testa oblongo-fusiformi, cinerea, delicata; anfractibus 8, quorum apice ipso minuto, subplanato, cæteris ad suturas multum impressis, centraliter carinatis, carinam supra mediam spiraliter lente uniliratis, et, infra, juxta sutura, carina secunda forti, sed minus prominula præditis, undique longitudinaliter minute et acutissime lamellosis, cinereis, ad carinas et supra tessellato-maculatis, ultimo tribus carinis decorato, versus basin paullum excavato, concentricè lirato; umbilicis profundo, angusto; apertura rotunda, peristomate continuo, tenui.

Long. 5, lat. 2.25 mm.

Hab. Persian Gulf, Muscat, 10-30 fathoms.

Allied to *C. holdsworthianus* ‡, G. & H. Nevill, which occurs at Karachi, with a wide range extending to Singapore (*Archer*). From this it differs in form, being more oblong, in colour, no bright tinting, in 8 against 5 whorls. Several examples occurred, all very similar.

* χαρμωσύνη, a delight.

† εὐτύχης, fortunate.

‡ Journ. Asiatic Soc. Bengal, 1871, p. 3, pl. i. fig. 18.

Euchelus xeniolum *, sp. n. (Pl. V. fig. 27.)

E. testa perparva, ovato-conica, imperforata, candida; anfractibus 7, quorum 3 apicales, apice ipso prominulo, duobus huic proximis longitudinaliter oblique liratis, cæteris apud suturas profunde impressis, supernis spiraliter 4-, ultimo 9-liratis, liris regularibus, superficie longitudinaliter oblique cancellato-decussata ad juncturas lirarum pulchre gemmato-nodulosis, gemmis nitidis, infra peripheriam ad basin minoribus, concinnis, regularibus; apertura rotunda, peristomate fere continuo, intus denticulato, margine columellari excavata.

Alt. 4.50, diam. 3 mm.

Hab. Gulf of Oman, Charbar, 5 fathoms.

A small white *Euchelus*, normal in general characters, beautifully and regularly spirally lirate and decussate; at the point of junction the gemmulate nodules are round and shining. Mouth small, roundish; peristome almost continuous; columella excavate.

Cylichna euthlasta †, sp. n. (Pl. V. fig. 28.)

C. testa perparva, fragilissima, ovato-cylindrica, alba, lateribus fere rectis, undique spiraliter arcto tenuistriata, striis sub lente minutissime depunctis; apertura versus basin paululum dilatata, supra angusta, vertice profunde umbilicata, margine rotundato, columella simplice.

Alt. 2.75, diam. .75 mm.

Hab. On rocks at low tide, Karachi.

Comparable with three species described by the late Mr. Edgar Smith (but unfortunately not figured), all of which occur in the same seas, viz., *consanguinea*, *perpusilla*, and *pumilissima* ‡.

The first of these is longitudinally curvedly striate, vertex encircled with acute carina round the umbilicus, lip slightly contracted in the centre.

Perpusilla is smaller and with quite smooth surface; while *pumilissima*, equally minute (alt. $1\frac{1}{2}$, diam. $\frac{3}{4}$ mm.), possesses longitudinal curved ridges and very dilated aperture basally.

The specimen selected for the type was accidentally broken after being figured, and a smaller example has to be considered the available co-type.

* ξενίολον, a little gift.

† εύθλαστος, fragile.

‡ Ann. & Mag. Nat. Hist. (4) ix. pp. 352-3.

Oxyñoë omega, sp. n. (Pl. V. fig. 29.)

O. testa ovata, cartilaginea, lævigata, epidermide tenui sordide straminea induta, postice contracta, spira depressa, acute truncatula, antice dilatata, rotundata, anfractu ultimo tumescente, labro fere recto, leniter ad basin rotundato, pertenui.

Alt. 6, lat. 4 mm.

Hab. Gulf of Oman, Charbar, 5 fathoms.

Several examples, some of which seem slightly malformed. *O. delicatula*, Nevill*, appears the nearest ally. This is reported from both Ceylon and Australia, and about the same size as the proposed new species; the last whorl is, however, much less tumid and full, and the posterior contraction more marked.

The name *Oxyñoë*, Rafinesque, 1819, has many years' precedence over *Icarus*, Forbes, 1844, and the better-known *Lophocercus*, Kroken, 1847.

Cylindrobulla systemma †, sp. n. (Pl. V. fig. 30.)

C. testa parva, elongato-cylindrica, tenuissima, membranacea, superficie undique lævi, subpellucete, ochraceo-straminea; anfractibus 3, apicalibus duobus inclusis deplanatis, ultimo maxime involuto; apertura angustissime supra, ad basin multum latiore, subtruncatulo.

Long. 6.25, lat. 3.75 mm. (sp. max.).

Hab. Gulf of Oman, Mekran Coast, off Charbar, 40 fathoms.

In form resembling the much smaller European species *C. fragilis*, Jeffr. *C. sculpta*, Nevill ‡, is also comparable. This species, much of the same dimensions, though a little broader proportionately, is very finely striate, our species being quite smooth.

Dentalium tomlini, sp. n. (Pl. V. fig. 31.)

D. testa medioeri, multum incurva, longitudinaliter regulariter costata, costis 11-12, interdum versus aperturam anticam evanescentibus, interdum undique fortibus, regularibus, interstitiis lævibus, paullum excavatis, superficie nunc albescente, nunc ochro-carnea, apice anali in speciminibus haud adultis perminimo, aliter sub lente bifisso, antice nequaquam expanso.

Long. 22, diam. antic. 3, post. 1 mm.

* Journ. Asiatic Soc. Bengal, 1869, p. 67, pl. xiii. figs. 5-5 c.

† σὺστρημμα, a roll.

‡ Journ. Asiatic Soc. Bengal, 1869, p. 68, pl. xiii. figs. 3-3 a.

Hab. Karachi.

Allied to *D. porcatum*, Gould, from Hongkong, to which at first I was inclined to allocate it. I am particularly indebted to Mr. J. R. le B. Tomlin for having, at my request, carefully examined and compared it with its congeners in the British Museum, and his verdict is as follows:—"I examined the single example of *D. porcatum* in the Cumingian collection, which is, I fancy, a co-type, and has a label, pasted underneath, in what I believe to be Gould's handwriting. Your Karachi shell is very similar, but more tapering, and possesses ribs running the whole length of the shell, whereas in *porcatum* the alternate ribs stop abruptly about $\frac{2}{3}$ of the way" (*in litt.*, Aug. 10, 1916). It gives me sincere pleasure to baptize this neat species with Mr. le Brockton Tomlin's name.

*Divaricella cypselis**, sp. n. (Pl. V. fig. 33.)

D. testa rotundo-globulari, parva albo-cinerea, delicatula, antice dorsaliter excavata, postice leniter declivi, deinde circa marginem ventralem rotundata, umbonibus contiguis, parvis, superficie, spatio centrali valvæ utriusque excepto, arcissime concentricè lirata, et antice, simul ac postice radiatim decussata, ad juncturas lirarum gemmata, valvis profundo convexis.

Alt. 4, lat. 5, diam. 2.45 mm.

Hab. Karachi, 20-30 fathoms.

A small rounded species, with finely sculptured divaricate liration, the surface of both valves being smooth centrally, and finely radiately decussate both anteriorly and posteriorly. The umbones are small, acute, shining.

Phacoides malcolmensis, sp. n. (Pl. V. fig. 32.)

P. testa parva, fere rotunda, alba, arcissime concentricè lamellata, lamellis paullulum flexuosis, hic illic irregularibus, supra, juxta et infra umbones sub lente minutissime decussatis, umbonibus prominulis contiguis, parvis, antice paullulum excavata, deinde rotundata, postice recte declivi marginem apud dorsalem, dentibus normalibus.

Long. 9.25, lat. 10 mm. (sp. maj.).

Hab. Persian Gulf, Malcolm Inlet, 35 fathoms.

A small white species with a fugitive light olive epidermis, very closely lamellate throughout. Only two or three

* *κύψελis*, a chest or box.

examples were dredged, and it is possible it may attain slightly larger dimensions, as we are not certain of these being adult.

Cypricardia vertumnalium *, sp. n. (Pl. V. fig. 34.)

C. testa sordide alba, solidula, polymorpha, oblonga vel ovata, nunc alta, ovata, umbonibus prominulis, nunc oblongo-depressa, umbonibus minutis, hic arcte concentrice lamellata, illic fere lævigata, superficie longitudinaliter inter lamellas arcte striata, lamellis rudibus, postice sæpius incurvis, intus alba, nitida, sinu palliali lato, profundo, dentibus variatis, plerisque normalibus, interdum cardinali laterali absente, vel deformi.

Alt. 26, lat. 22, diam. 13 mm. (sp. max.).

Hab. Karachi.

A polymorphic species which cannot exactly be matched with any other of the recent forms, with which we have carefully compared it, simple though its appearance and characters be. Through the kindness of Mr. G. B. Sowerby we have received a suite of specimens, all from the same locality, or collected by Mr. Townsend, and these each exhibit some varietal phase.

Carditella concinna, sp. n. (Pl. V. fig. 35.)

C. testa perminuta, solidiuscula, æquivalvi, fere æquilaterali, subtriangulata, concinna, umbonibus contiguis, margine dorsali antice excavatula, postice leniter declivi, deinde ventrali rotundata, costis longitudinalibus tredecim, latis in utraque valva, superficie undique arcte tenuiter striata.

Alt. 1.75, lat. 2, diam. 1 mm.

Hab. Karachi.

An exceedingly small but neat little shell, the shape somewhat triangular, slightly excavate dorsally in front and posteriorly gradually sloping off to the rounded ventral margin. Slightly convex; both valves, almost equilateral, are provided with thirteen flattened ribs, the interstices being exceedingly narrow, all everywhere crossed by transverse very fine striæ. It occurred most rarely.

* *Vertumnus*, the god of mutability, had festal days, entitled "Vertumnalia," dedicated in his honour.

EXPLANATION OF THE PLATES.

PLATE IV.

- Fig. 1. *Bursa gnorima*.
 Fig. 2. *Alectryon (Phrontis) alcinus*.
 Fig. 3. — (*Hima*) *protrusidens*.
 Fig. 4. — (—) *gwatkinianus*.
 Fig. 5. *Pisania townsendi*.
 Fig. 6. *Mitra vaticinator*.
 Fig. 7. — (*Pusia*) *iteina*.
 Fig. 8. *Lamellaria (Chelynotus) bergii*, Desh. (juv.).
 Fig. 9. *Melanella lampra*.
 Fig. 10. *Mucronalia acthria*.
 Fig. 11. *Turbonilla umbrina*.
 Fig. 12. — *exilispira*.
 Fig. 13. — *patruelis*.
 Fig. 14. — *thryallis*.
 Fig. 15. *Styloptygma clymene*.
 Fig. 16. *Eulimella squarrosula*.
 Fig. 17. *Cingulina discernenda*.
 Fig. 18. *Triphora incolumis*.

PLATE V.

- Fig. 19. *Amphithalamus psomus*.
 Fig. 20. *Rissoina (Chiliosigma) refugium*.
 Fig. 21. *Fossarus eutorniscus*.
 Fig. 22. — (*Couthouzia*) *cancellarius*.
 Fig. 23. *Triphora interpres*.
 Fig. 24. *Leptothyra miltochrista*.
 Fig. 25. *Minolia charmosyne*.
 Fig. 26. — (*Conotrochus*) *eutyches*.
 Fig. 27. *Euchelus xenichum*.
 Fig. 28. *Cylichna euthlasta*.
 Fig. 29. *Oxynoë omega*.
 Fig. 30. *Cylindrobulla systemma*.
 Fig. 31. *Dentalium tomlini*.
 Fig. 32. *Phacoides malcolmensis*.
 Fig. 33. *Divaricella cypselis*.
 Fig. 34. *Cypriocardia vertumnalium*.
 Fig. 35. *Carditella concinna*.

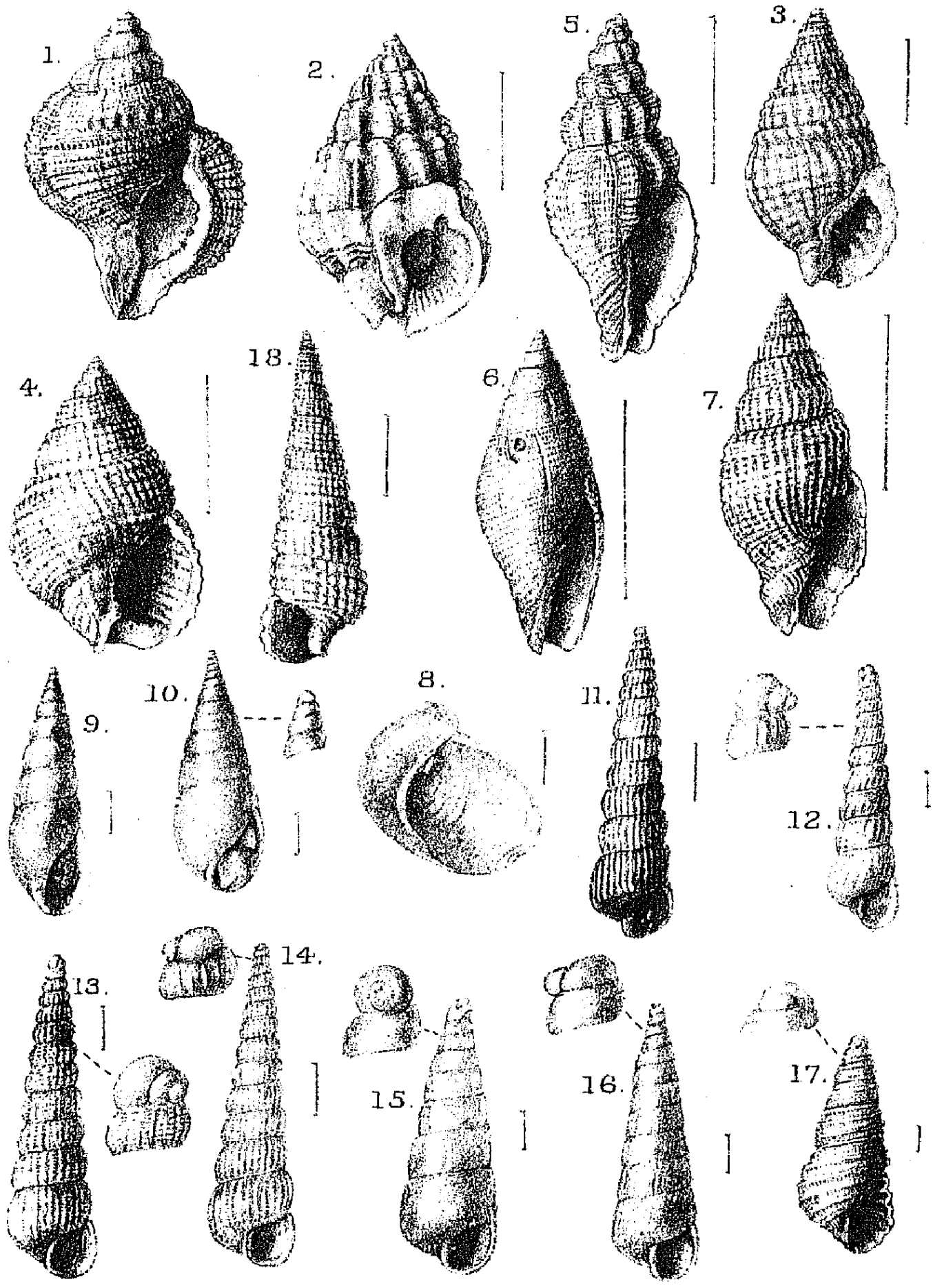
XVII.—*Descriptions and Records of Bees.*—LXXIX.

By T. D. A. COCKERELL, University of Colorado.

Colletes gigas, sp. n.

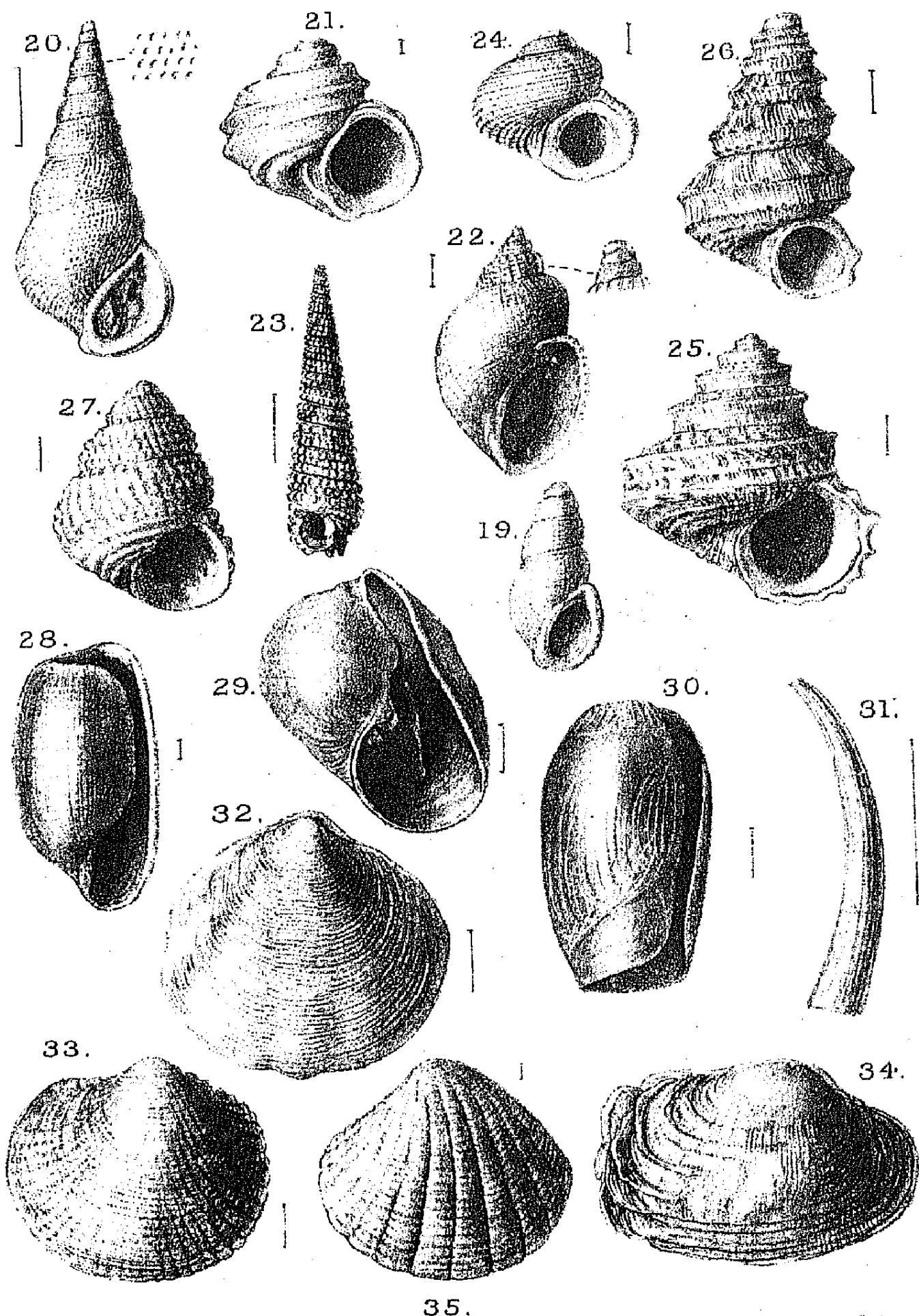
♀.—Length about 17 mm.; anterior wing 12 mm.

Black, including legs and antennæ, the middle of flagellum faintly reddish beneath; tegulæ clear ferruginous; hair of



G.M. Woodward del et lith.

Huthiap.



G.M. Woodward del. et lith.

Huth imp.