rounded posterior angles, and a slightly concave posterior margin.

The dorsal plate of the anal segment quadrate, with straight margins, raised lateral borders, and a conspicuous median longitudinal sulcus. On each side the dorsal plate descends so as to form the lateral portion of the segment and so as to be separated by but a narrow space from the ventral plate.

The pleuræ of the anal segment appearing in the narrow space between the dorsal and ventral plates, extending behind slightly beyond the margin of the ventral plate, but not beyond the margin of the dorsal plate; not armed with spines; thickly punctured.

Tibiæ and tarsi of most of the legs armed below with a strong spur; claws of legs mostly armed.

Anal legs very thick, punctured, without spines, in contact; the inner surface of the three proximal segments flattened; the upper inner margin of the proximal segment raised.

Claw of anal leg unarmed.

Length about 20 millim.

I have had no opportunity of examining the type specimen either of *Op. postica*, Wood, or of *Op. crassipes*, Meinert. But the descriptions of these two species are so much alike and are so applicable to *Theatops postica*, Newport, that I have without hesitation regarded the three specific names as being referable to but one form.

Dr. Meinert suggests that *Op. spinicauda*, Wood, may be synonymous with *Th. postica*, Newport; but if the figure and description of the former species are to be trusted, the two must still be considered distinct.

EXPLANATION OF PLATE XVI. Figs. 6–10.

Fig. 6. Anterior portion of the body of *Theatops postica* (Say), seen from above.
Fig. 7. Head of ditto, seen from below.
Fig. 8. Anal segment of ditto, seen from above.
Fig. 9. The same, seen from below.
Fig. 10. The same, seen from the side.

XXXVI.—*Descriptions of new Species of Oriental Homoptera belonging to the Family* Cicadidæ. By W. L. Distant.

As I am now engaged in identifying such species belonging to other collections as are kindly submitted to me for the furtherance of my intended Monograph, it becomes necessary to publish these descriptions in order to prevent the unsatisfactory course of distributing MS. names only. The species will be all subsequently figured.

Huechys suffusa, n. sp.

Head and thorax above black; front of the head and two large spots on mesonotum red; abdomen red; eyes brownish ochraceous. Head and thorax beneath black, the face and abdomen beneath red. Tegmina pale opaque blackish, the apical area broadly dull opaque greyish, with the margins of the lower apical area blackish; wings pale dull greyish hyaline, the venation darker.

Rostrum somewhat mutilated, but apparently reaching the intermediate coxæ; face large and moderately compressed.

Long. excl. tegm. 21 millim., exp. tegm. 52 millim.

Hab. Java. Coll. Dist.

Cœana delinenda, n. sp.

Huechys octonotata, Walk. (nec Westw.), List Hom. i. p. 253. n. 10 (1850).

Body above brownish ochraceous. Head with the apex of front and a transverse fascia in front of eyes, including area of ocelli, black. Pronotum with a central hourglass-shaped fascia and two large oblique spots on each side black. Mesonotum with a central fascia (somewhat similar to that on pronotum) and a large spot on each lateral margin black; basal cruciform elevation blackish, its anterior angles ochraceous. Abdomen with the posterior segmental margins blackish. Body beneath and legs brownish ochraceous, disk of face and a spot before eyes blackish. Tegmina pale brownish ochraceous; wings brown, with about basal third red.

Long. excl. tegm. 19 millim., exp. tegm. 47 millim.

Hab. Cochin (coll. Dist.), Silhet (Brit. Mus.).

By a strange oversight Walker placed this species in the British-Museum collection under the name of *Huechys octonotata*, Westw., and actually redescribed that species under the name of *H. picta* (Ins. Saund. Hom. p. 28).

Dundubia ærata, n. sp.

Body above resembling *D. mannifera*, Linn., but much larger; beneath with the opercula small, narrow, concavely sinuated towards the middle, their apices obtusely rounded and reaching the third abdominal segment (rostrum mutilated).

Tegmina and wings pale hyaline, their apical areas (especially those of tegmina) suffused with bronzy brown.

Long. excl. tegm. 50 millim., exp. tegm. 120 millim.

Hab. Borneo, Elopura (*Pryer*). Coll. Dist.

Dundubia tavoyana, n. sp.

Above resembling in size, general hue, and markings *D. tripurasura*, Dist., but differing remarkably from that species by the size and shape of the opercula, which have their apices somewhat acutely pointed and reaching the penultimate abdominal segment, their lateral margins being concave near base, convex about centre, and somewhat profoundly concave towards the apices; their colour is also pale olivaceous green.

Long. excl. tegm. 30 millim., exp. tegm. 80 millim.

Hab. Tavoy. Calc. Mus.

Dundubia similis, n. sp.

Above very closely resembling *D. radha*, Dist., the thoracic markings similar, but the colour more olivaceous green. It differs from *D. radha*, however, by the shape and length of the opercula, which do not extend beyond the third abdominal segment, and have their apices somewhat obtusely rounded.

Long. excl. tegm. 50 millim., exp. tegm. 122 millim.

Hab. Sikkim. Coll. Dist.

Cosmopsaltria nigra, n. sp.

♂. Body above and beneath with the legs blackish; eyes and ocelli dark fuscous brown. Tegmina and wings smoky hyaline, the venation fuscous, the tegmina with the transverse veins at the bases of the second and third apical areas, and the apices of the longitudinal veins to apical areas, infuscated.

The rostrum about reaches the apices of the posterior coxæ; the opercula are concavely sinuated a little before centre, their apices convexly rounded and almost reaching apex of fourth abdominal segment.

Long. excl. tegm. 44 millim., exp. tegm. 110 millim.

Hab. Philippine Islands.

This species was erroneously identified by Walker as *Dundubia spinosa*, Fabr. (the type of which is contained in the Banksian collection), and remains under that name in the National Collection. The habitat is derived from one of those specimens, my own being without a locality.

Cosmopsaltria umbrata, n. sp.

♂. Head and thorax above obscure olivaceous. Head with the lateral margins to front, the area of the ocelli, and some irregular spots on each lateral area of the vertex black; eyes ochraceous. Pronotum with two irregular central black fasciæ, ampliated at base and apex, and two at each lateral margin, the posterior margin with its edge narrowly black and a black spot near lateral angles. Mesonotum with two central blackish obconical spots, between which a narrow black fascia extends to base, and a black spot in front of each anterior angle of the basal cruciform elevation. Abdomen above largely suffused with dull black shadings. Body beneath olivaceous; a central fascia to face, anterior margin between face and eyes, inner margins and apices of femora, and the tibiæ more or less blackish. Opercula olivaceous, their apices and a spot near base blackish. Abdomen beneath olivaceous, largely suffused with black shadings. Tegmina and wings pale hyaline, the venation fuscous; tegmina with the base and costal membrane fuscous, the transverse veins at the bases of the second, third, fifth, and seventh apical areas and the apices of the longitudinal veins of apical areas infuscated.

The rostrum has the apex pitchy and just passing the posterior coxæ; the opercula are somewhat narrowed, concavely sinuated on each side near base, and narrowed towards apices, which are obtusely angulated and reach the fourth abdominal segment.

Long. excl. tegm. 46 millim, exp. tegm. 120 millim.

Hab. Sikkim. Coll. Dist.

Cosmopsaltria lauta, n. sp.

♂. Head and thorax above ochraceous, with the following black markings:—Head with a central fascia to front, vertex with a central double fascia and a sinuated fascia behind each eye; pronotum with a central double fascia united at base, a large sublateral spot on each side, and a spot beneath on basal margin; mesonotum with a central longitudinal fascia, on each side of which is a short and somewhat oblique fascia, followed by a small spot on anterior margin and a broad, sublateral,

irregular fascia, and a spot in front of each anterior angle of the basal cruciform elevation. Abdomen purplish red, the posterior segmental margins ochraceous, excepting those near apex, which are piceous, and with a central discal piceous spot near base. Head beneath with the anterior margin black and a central piceous spot near apex of face. Opercula ochraceous, with apices and inner margins broadly black; apex of abdomen beneath black. Tegmina and wings pale hyaline, the venation more or less fuscous; tegmina with the costal membrane castaneous, the transverse veins at the bases of the second and third apical areas infuscated.

The face is convex, with a central longitudinal incision, which neither reaches base nor apex. The opercula are long and broad, concavely sinuated on their outer margins near base, their apices obtusely rounded and about reaching the apical abdominal segment. Rostrum *mutilated*.

Long. excl. tegm. 35 millim., exp. tegm. 102 millim.

Hab. Pontianak (West Coast, Borneo). Brussels Mus.

Cosmopsaltria minahasæ, n. sp.

♂. Body above pale obscure olivaceous, more or less covered with pale ochraceous pile. Head with the front anteriorly striated and with two apical, black, central spots; vertex with some scattered black spots, the ocelli reddish. Pronotum with a central, longitudinal, ochraceous fascia, bordered with black and with an irregularly rounded black linear spot near each lateral margin. Mesonotum with seven black spots, three central and two near each lateral margin, and a black spot in front of anterior angles of cruciform elevation. Tympana with grey pilosity; abdomen above also much shaded with greyish pile. Body beneath greyish, with an olivaceous tinge; apical portion of the face black; apices of the femora and tibiæ and the tarsi dark fuscous; apical abdominal segment infuscated, anal appendage with a central fuscous fascia. Tegmina and wings pale hyaline, venation brownish, ochraceous at the base of upper ulnar area, and the transverse veins at the bases of the second and third apical areas broadly infuscated.

The opercula are pale olivaceous, somewhat gradually narrowing towards apices, which are obtusely angulated and reaching the apex of the fourth abdominal segment; rostrum reaching the second abdominal segment, its apex fuscous.

Long. excl. tegm. 35 millim., exp. tegm. 100 millim.

Hab. Celebes, Menado (coll. Dist.), Ceram (Brit. Mus.).

A specimen of this species from Ceram was identified by Mr. Walker as *Dundubia doryca*, Boisd., and still remains under that name in the National Collection.

Cosmopsaltria silhetana, n. sp.

Body above shining brownish olivaceous. Head with two central black spots on front and with an irregular black fascia across vertex, widening at area of ocelli, and the posterior margin of the eyes black. Pronotum with two central black fasciæ, the oblique incisures black, the basal margin greenish. Mesonotum with the following black markings:—a central longitudinal fascia, on each side of which is a slightly oblique obconical spot; these are each followed by a very much smaller spot, and again by a short, broad, irregular spot, all starting from anterior margin; two long discal spots and a small rounded spot in front of each anterior angle of basal cruciform elevation. Abdomen above with the disk much shaded with dark shining fuscous; posterior segmental margins greenish. Body beneath very pale olivaceous, with a greyish tinge; face with the apex and a central fascia black; apex of rostrum, apices of the tibiæ, anterior tarsi, and bases and apices of intermediate and posterior tibiæ fuscous. Tegmina and wings pale hyaline, venation brownish; costal membrane and base of upper ulnar area ochraceous; transverse veins at bases of second and third apical areas infuscated.

The rostrum reaches the apex of the posterior coxæ; the opercula gradually narrow towards apices, which are obtusely angulated and reach the fourth abdominal segment.

Long. excl. tegm. 28 millim., exp. tegm. 72 millim.

Hab. Silhet. Coll. Dist.

Cosmopsaltria [illegible], n. sp.

Allied to *C. oopaga*, Dist., and very similar above in colour and markings. Differs from that species by the size and shape of the opercula, which are longer—reaching the penultimate abdominal segment—narrower, and with their apices somewhat angularly rounded.

Long. excl. tegm. 37 millim., exp. tegm. 98 millim.

Hab. Johore. Calc. Mus.

Pomponia solitaria, n. sp.

Body above ochraceous. Head with the eyes dark fuscous; front with two central black spots on anterior margin and two

small rounded black spots at base; vertex with the area of the ocelli—which are red—a curved line before each eye, and a spot near each anterior lateral angle, black. Pronotum with two central black lines, united at base, and a black spot on each lateral margin. Mesonotum with the following black markings, viz. three central lines, the central one extending across disk, followed by a shorter line on each side, and again by an irregular line which reaches nearly across disk, and a black spot in front of each anterior angle of basal cruciform elevation. Tegmina and wings pale hyaline, the first with the costal membrane and venation ochraceous, the transverse veins at bases of second and third apical areas infuscated; venation of wings generally ochraceous.

The rostrum reaches the apices of the posterior coxæ; the opercula are small, not reaching the apex of the basal segment of the abdomen.

Long. excl. tegm. 28 millim., exp. tegm. 75 millim.

Hab. Andaman Islands, Narkondam. Calc. Mus.

Pomponia obnubila, n. sp.

Allied to *P. maculaticollis*, Motsch., but differing from that species by the darker and more obscure hue of the body, the distinctly pale fuscous tegmina and wings, and by the length of the rostrum, which considerably passes the posterior coxæ and terminates on the overlapping opercula.

The head is also much narrower than in *P. maculaticollis*, and the opercula are unicolorous and more convex posteriorly.

Long. excl. tegm. 30 millim., exp. tegm. 110 millim.

Hab. Simla. Calc. Mus.

Cryptotympana Limborgi, n. sp.

Cryptotympana recta, Dist. (nec Walk.), J. A. S. Beng. vol. xlviii. p. 40, pl. xi. fig. 4 (1879).

♂. Body above olivaceous brown. Head with the lateral striations to front and a transverse fascia between the eyes black. Pronotum with two central, oblique, discal, black fasciæ; the posterior margin olivaceous, with its inner border and the anterior margin narrowly black. Mesonotum with two central, obconical, black fasciæ on anterior margin, between which is a very narrow and indistinct dark line; on each side of the obconical spots is a smaller spot and a short oblique, discal, black fasciate line on each side near base. Abdominal segmental margins and inner area of tympana blackish; abdomen laterally clothed with greyish pile. Body beneath olivaceous brown; anterior tibiæ and tarsi, apices of intermediate and posterior tibiæ and the tarsi blackish. Opercula olivaceous, with their inner margins blackish; abdomen beneath dark castaneous, the lateral margins broadly covered with ochraceous pile. Tegmina and wings pale hyaline, their bases blackish, the venation ochraceous or fuscous; tegmina with the costal membrane olivaceous, the apical costal margin blackish; transverse veins at the bases of second and third apical areas infuscated.

The opercula are short and suboval, their inner margins straight at base and then obliquely deflected to apices, which do not extend beyond the basal abdominal segment; their outer margins are slightly oblique and convexly deflected at apices. Rostrum mutilated.

Long. excl. tegm. 32 millim., exp. tegm. 95 millim.

Hab. Tenasserim (*Limborg*). Calc. Mus.

When describing the Rhynchota collected by Mr. Ossian Limborg in Upper Tenasserim the typical female *Cryptotympana recta*, Walk., was alone known to me, and I then opined that the specimen here described as a new species might prove to be the male of *C. recta*. I now possess the male of that species, and find the Tenasserim specimen to represent a very distinct and undescribed species.

Cicada elopurina, n. sp.

♀. Body above castaneous. Head with a fascia across front, a spot near base of antennæ, the area of the ocelli, and a spot behind the eyes black. Pronotum with two central black fasciæ, the posterior margin more or less olivaceous. Mesonotum with two central, incurved, black spots starting from anterior margin, between which is a black fascia crossing the whole of disk; beyond the central incurved spots is a small spot on each side and a sublateral and somewhat indistinct black fascia; a black spot in front of each anterior angle of the basal cruciform elevation. Abdomen above with the posterior segmental margins black. Body beneath thickly clothed with greyish pile; face with a central black fascia. Tegmina and wings pale hyaline, the venation very dark olivaceous or brown; tegmina with the costal membrane olivaceous.

♀. Long. excl. tegm. 28 millim., exp. tegm. 82 millim.

Hab. Borneo, Elopura (*Pryer*). Coll. Dist.

Cicada pontianaka, n. sp.

Head and thorax above dark ochraceous. Head with the front laterally striated with black; vertex with the area of the ocelli and the lateral areas black. Pronotum with two short, central, black fasciæ at base, which widen anteriorly to behind the eyes; the posterior margin olivaceous. Mesonotum with two central obconical spots, between which is a central spot widened at base and a curved spot on each lateral area, all black. Abdomen above dark castaneous, shaded with pitchy suffusions and sparingly and palely pilose. Body beneath ochraceous; femora and tibiæ tinged with castaneous, excluding apices of femora and bases of tibiæ; opercula pale castaneous, the margins palely pilose. Abdomen beneath dark castaneous, the margins palely pilose. Tegmina and wings pale hyaline, the venation dark brownish; tegmina with the apical area shaded with bronzy reflections; the costal membrane castaneous, excepting apical half, which is black; base greenish, transverse veins at bases of second and third apical areas narrowly infuscated.

The face is somewhat flat and deeply transversely striate, excepting a central, longitudinal, levigate line; the rostrum is *mutilated*; the opercula do not extend beyond the basal abdominal segment, have their lateral margins somewhat straight, their inner margins very slightly overlapping, and their apices somewhat broadly rounded.

Long. excl. tegm. 32 millim., exp. tegm. 97 millim.

Hab. Pontianak (West Coast, Borneo). Brussels Mus.

XXXVII.—*Shell-growth in Cephalopoda* (*Siphonopoda*). By F. A. Bather, B.A., F.G.S., of the British Museum (Natural History).

INTRODUCTION.

Up to 1886 the formation of the shell in Cephalopoda was explained by a hypothesis, either of simple lime-secretion (2) or of lime-deposition in cellular membranes thrown off from the mantle of which they were once a constituent (1 and 3); in that year Dr. Riefstahl proposed a hypothesis of growth by intussusception (8) similar to that previously proposed by Müller for Lamellibranchs (7). Riefstahl's conclusions, based on *Sepia*, were extended by him through *Belemnites* to

Ammonites, and so, by analogy, on to *Nautilus*; the induction was blindly followed in a leader by "Naturforscher" (9). At the beginning of this year Dr. v. Lendenfeld tried to convict Riefstahl of similar blindness, and himself falls into the ditch (12). With the drift, however, of his "Bemerkung" I am glad to agree, since it is a repetition, though incomplete, of two lines previously written by me. As the note containing those lines (10) gives both abstract and criticisms of Riefstahl's results, I beg my kind readers to glance at it before continuing their present perusal.

In this paper I wish:—I. to make a personal explanation respecting the parallelism of v. Lendenfeld's work with mine; II. to criticize his methods of work and argument; III. to refute Riefstahl's conclusions; IV. to propound a theory of shell-growth that shall harmonize with the facts of phylogeny no less than with those of ontogeny.

I. Personal Statement.

Von Lendenfeld says that Moseley was the first English biologist to observe Riefstahl's paper, and that he consulted Lankester, with whom v. Lendenfeld then was. My introduction to the subject also came from Prof. Moseley, who allowed me to study it in his laboratory at Oxford; and there my work was done in the spring of 1887. Moseley at first inclined to Riefstahl's conclusions; unhappily his sad illness prevented subsequent discussion. The young Nautilus-shell examined by v. Lendenfeld was seen by me at the British Museum for the first time in July 1887; it of course confirmed my previous conclusions. I never knew that anyone intended to figure it. The editors of the Geol. Mag. had my MS. by the end of July 1887, about which time I heard that v. Lendenfeld had been working on this point. The latter had, I believe, left England when my note appeared, so that he probably did not see it; and I must apologize to him for being delayed by ignorance of his address in sending him a copy.

This explanation was needed to show that, though v. Lendenfeld and myself received inspiration from the same source, our work was independent; it will also be seen that our methods of work were not quite the same.

II. Criticism of v. Lendenfeld.

In the first place, it appears that v. Lendenfeld only examined a single young Nautilus-shell; he, however, speaks