

they were not actually bred, mines were found the same year on this tree and he thinks they almost certainly belonged to this species.

If *erecta* (C. G. Thomson 1871) is possibly synonymous with *H. nigripes* (Konow 1907). Unfortunately I had already returned the type of *Fmwa nigripes* Konow to Berlin when I received Malaise's specimens, so that I was not able to compare specimens of the two.

#### *Fenusa* Leach and *Fenella* Westwood.

These two genera are evidently closely related, but differences in habit—the former being attached to trees and the latter to herbs—support the slight structural characters mentioned above, for keeping them distinct. *Fenella* differs from all the other genera in this tribe in having very reduced tamal pulvilli. *Kaliufenusa* MacGillivray for *Fenusa ulmi* Sunderland could also be separated from *Fenusa* if this were thought desirable, but as it would be for a single species, it does not appear to me to be advisable at present; nevertheless, apart from slight differences in the adults, Yuasa (1922: 96-7) shows that there are marked differences in the larvae. *Paraphyllotoma* Forsius, represented by the single species *P. judaica* Fennius 1930 (Palestine), appears to be a typical *Fenella* except for its 16-segmented antenna. It is not unique in this, however, as I have a single specimen of a closely related undescribed species which I collected in Switzerland in 1935, also with 16-segmented antennae. The type of *Fenella westwoodi* Cameron (Scotland) is an abnormal specimen of *Fmwa dohrni* (Tischbein) Enslin (syn. n.), having the left antennae 10-segmented and the right 9-segmented.

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#### OEOGRAPHICAL VARIATION IN *SCINTHARISTA NOTABILIS* (WALKER 1870) (ORTOPTERA, ACRIDIDAE)

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THE Oedipodine genus *Scintharista* was established by Saussure (1884, *Prodr. Oedipod.*: 121) for *S. brunneri* Saussure 1884, *Oedipoda venusta* Fieber 1863 and *Oedipoda wagneri* Eversmann 1859, but the same author in 1888 (*Aj&c. Prodr. Oedipod.*: 36) removed the two last-named species to the genus *Mioscirtus* Saussure (a misprint for *Mioscirtus* Saussure, *loc. cit.*: 18, 175), leaving only *S. brunneri* as the available genotype. An obvious synonym of *Scintharista* is *Quiroguesia* I. Boviivar (1886, *Ann. Soc. exp. Hist. nat.* 16: 616) based on *Acridium minutum* Brullé 1842; this has already been pointed out by me (Uvarov, 1922, *J. Bombay nat. Hist. Soc.* 28: 360), when I also attempted to elucidate the geographical variation of the species and recognised two subspecies. Since then large series of specimens from the whole distribution area of the species have accumulated in my hands, and their critical study has enabled me to present the following revision of the species and its geographical races.

The geographical variation of *S. notabilis* involves the coloration of the disc of hind-wings and the width of their dark fascia; the pattern of the elytra; and the coloration of hind tibia. While additional characters are sometimes found in the relative measurement of parts, etc. While a general discussion of the variation will be offered after the descriptive part of the paper, the following definitions are necessary in order to make the descriptions clear.

**Wing fascia.** The width of the dark fascia of the wing varies appreciably between subspecies, while remaining reasonably constant in the same sex, and sometimes in both sexes, of a subspecies. For diagnostic purposes, it appears useful to measure the width of the fascia where it is intersected by the anal vein (Saussure), or vena dividens (Snodgrass 1929, *Smithson. misc. Coll.* 82(2): 86, fig. 45, VD) the apex of which marks the posterior end of the first lobe of the wing. The width of the fascia is then expressed as a decimal fraction of the length of the first vein.

**Elytral pattern.** This consists mainly of the alternating dark (black, brown, or greyish-ochraceous) and light (white, or hyaline) transverse fasciae. Their position and sequence are as follows:—

**First dark (D.1).** Base of the clytrium to the middle of the discoidal area. Usually spotted with lighter colour, and sometimes its proximal part lighter than the distal.

**First light (L.1).** Very narrow, white and sharply delimited in the darker coloured subspecies, but broader, light-buff and imperfectly delimited in the lighter subspecies. Sometimes becomes obsolete, with the result that D.1 and D.2 form a single very large fascia.

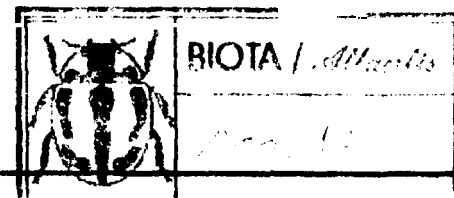
**Second dark (D.2).** Apical third of the discoidal area and a little distance beyond its apex. Usually more sharply delimited distally than proximally. Sometimes (see above) not separated from D.1.

**Second light (L.2).** Separating D.2 from D.3. Practically always distinct, both the membrane and the vein and veinlets within its limits being white, or whitish. Usually better delimited proximally than distally.

**Third dark (D.3).** In the middle of the post-discoidal half of the clytron. Present as a definite fascia only in the darkest forms, but mostly indicated only by more or less confluent small brown spots, or brown-bordered cells.

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**Third light (L.3).** Preapical in position, separating D.3 from D.4. Hyaline, broad and with indefinite outlines even in the darkest subspecies.

**Fourth dark (D.4).** On the apex, occupying the whole of it in the darkest subspecies or split up into small spots in the lighter ones.

#### Key to subspecies.

- 1(10). Disc of hind-wings red, of various shades. Wing fascia narrow (0.11-0.14; plate 1, figs. A, B, D).
- 2 (3). Hind tibia ivory-white, without trace of reddish. Elytra (plate 1, fig. B): L.1 very weak, or absent; D.1 and D.2 fused, making the whole basal half of elytron light dusty-brown, with small spots of lighter shades; L.2 broad; D.4 weak, split up into small spots. Wings: disc light-red, tending to fade out on the anal margin.—Eastern Iran (Khorasan); Baluchistan; N.W. India . . . 3. *pallipes* subsp. n.
- 3 (2). IIIrd tibia orange-yellow to light-red.
- 4 (9). Wings: disc without bluish tinge near the anal margin. Elytra (plate 1, fig. A): L.1 very weak, but usually perceptible.
- 5 (8). Larger, more slender, and scarcely rugulose. Frontal ridge in profile almost straight, forming a distinct angle with the vertex; pronotal carina not convex in profile (fig. 1, N). Hind femur narrow, four times as long as its minimum width. Hind tibia orange-red, fading to yellowish basally, but without a distinct postbasal ring.
- 5 (7). Wings: disc light-red.—Canary Islands; Morocco; Algeria; Tunisia; S. Spain . . . 1. *notabilis* (Wlk.).
- 7 (6). Wings: disc brick-red.—Anglo-Egyptian Sudan; Somaliland. 2. *lateritia* subsp. n.
- R (5). Smaller, more robust, distinctly rugulose. Frontal ridge in profile convex, forming a wide arch with the vertex; pronotal carina convex in profile (fig. 1, C). Wings: disc rose-red. Hind tibia light-red, with a distinct white postbasal ring.—India (Cutch peninsula) 4. *cinclipes* subsp. n.
- 9 (4). Wings: disc light-red, with distinct bluish tinge near the anal margin; the anal portion with alternating red (narrow, raised) and bluish (intercalate, sunk) veins. Elytra (plate 1, fig. D): L.1 absent; D.1 and D.2 fused, forming a continuous brownish area, with small lighter spots, occupying the basal half of the elytron; D.3 absent and D.4 either absent or very weak, so that the whole distal half of the elytron is hyaline, with irregularly scattered small brownish spots, or brown-margined cells. IIIrd tibia reddish-orange, fading to white basally.—Arabia; Palestine . . . 5. *blanchardiana* (Sauss.), ♂.
- 10 (1). Wings: disc yellow; fascia broad (0.16-0.20; plate 1, figs. C, E, F).
- 11(12). Wings: disc pale greenish-yellow, becoming bluish close to the anal margin; fascia very broad (0.20). Elytra (plate 1, fig. C): L.1 absent; D.1 and D.2 fused and occupying the basal half of the elytron; D.3 and D.4 absent, the whole distal half being hyaline, with small scattered brown spots. IIIrd tibia orange-red, with not sharply defined whitish postbasal ring.—Arabia; Palestine 5. *blanchardiana* (Sauss.), ♀.
- 12(11). Wings: disc intense lemon-yellow, without bluish tinge near the anal margin; fascia broad (0.16). Elytra (plate 1, figs. E, F): all fasciae well defined. Hind tibia without trace of red.
- 13(11). Elytra (plate 1, fig. E): all fasciae distinct, but not sharply delimited; dark fasciae more or less spotted with light. Hind tibia dirty-white. N.W. Iran (Shahrud); Chitral; Kashmir (?) 6. *brunneri* (Sauss.).

- 14(13). Elytra (plate 1, fig. F): all fasciae very sharply delimited, the dark ones being almost black, without lighter spots, and the light ones white. Hind tibia honey-yellow.—Araxes valley . . . 7. *miramae* subsp. n.

Measurements of subspecies in mm.

	Body		Elytra		Wing fascia (index)		Hind femur	
	♂	♀	♂	♀	♂	♀	♂	♀
<i>notabilis</i>	23-29	33-37	22-5-27	31-35	0.12	0.14	12.5-15	17-19
<i>lateritia</i>	24-28	33-39	25-27	34-37	0.12	0.14	14-15	17-19
<i>pallipes</i>	25-30	36-40	25-31	34-38	0.12	0.13	14-16	18-20
<i>cinclipes</i>	22	30	24	28	0.11	0.13	14	16
<i>blanchardiana</i>	26-28	39-42	25-28	38-41	0.11	0.20	13-16	16-23
<i>brunneri</i>	26	38	27	30	0.16	0.17	15	19
<i>miramae</i>	25-27	38	28	40	0.16	0.17	14	19

#### ANNOTATED LIST OF SUBSPECIES.

1. *S. notabilis notabilis* (Walker 1870), plate 1, fig. A; text-fig. N.

1840. *Acridium miniatum*, Brullé in Webb et Berthelot, *Hist. nat. Isles Canar.* 2 (2), *Entom.*: 78, pl. 6, fig. 13.
1870. *Oedipoda notabilis*, Walker, *Cat. Derm. Salt. Brit. Mus.* 4: 745.
1884. *Oedipoda brullei*, Saussure, *Prodr. Oedipod.*: 148, 153.
1880. *Quiroguesia miniata*, L. Bolivar, *An. Soc. esp. Hist. nat.* 15: 515.
1888. *Quiroguesia brullei*, Saussure, *Addit. Prodr. Oedipod.*: 35.

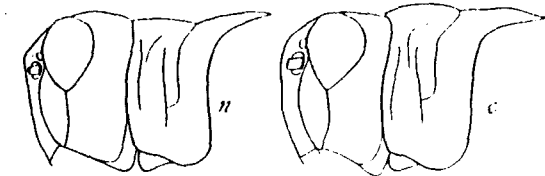


FIG. 1.—n, *Scintharista notabilis notabilis* (Walk.), ♂, head and pronotum in profile; c, *S. n. cinclipes*, subsp. n., ♂, ditto.

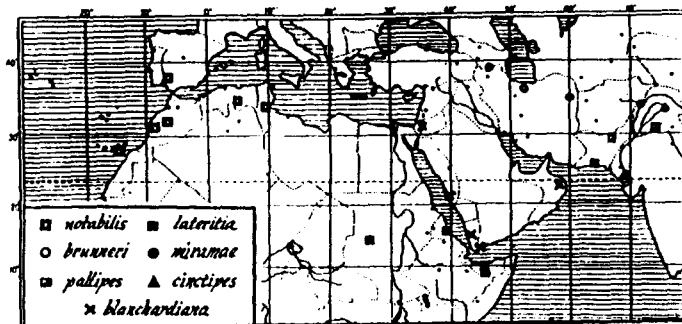
**Nomenclature.** The first description of the species and of the Canarian subspecies is by Brullé and dates from 1840 (not 1842, as usually given; cf. Sherborn, *Index Anim.* 2: 4071). Unfortunately, the combination *Acridium miniatum* used by Brullé had already been previously employed by Fischer-Waldheim (1822, *Entomogr. Imp. Russ.* 1: 38, pl. 1, fig. 2) for the insect called by him *Acryptum miniatum* Pallas, now *Oedipoda miniata* (Pallas 1771). This makes *miniatum* of Brullé a homonym in the genus *Acridium* (unless an ultra-formal view of the different spelling of the generic name in the two cases is taken) and the international rules, as they now stand, do not permit the retention of Brullé's name. Saussure (1884, *loc. cit.*) rejected the name *miniatum* Brullé because he thought this was a misuse of *miniatum* Pallas (cf. Saussure, 1888, *loc. cit.*: 35, footnote), while actually Brullé used it as a name for his own species by calling it "*Acridium miniatum*, Br." as in the case of all his new species. Saussure's name, *brullei*, however, is in any case antedated by *notabilis* Walker.

*Description.* Relatively robust, and short-winged. Elytra: D.1 and D.2 almost fused, L.1 being very weak; D.3 and D.4 absent or weak, and the whole distal half of elytron is hyaline, with small brown spots, or brown-margined cells. Wings: disc light-red; fascia narrow. Hind tibia orange-yellow.

*Type locality.* *Acridium minutum* Brullé—Canary Islands; *Oedipoda notabilis* Walker—"Sandwich Islands," but this is a case of mislabelling (cf. Uvarov, *Trans. ent. Soc. Lond.* 1925 :299) and the type was certainly from the Canary Islands, probably from Teneriffe, which I here select as the type locality.

*Distribution.* CANARY ISLANDS: Teneriffe; Gran Canaria; Las Palmas; Gomera (see Willemse 1936, *Natuurhist. Maandbl.* 25 :102, where previous references are given). MOROCCO: Sidi Ifni (I. Bolivar 1936, *Eos* 11 :404); Marrakesh; Agadir (I. Bolivar 1914, *Mem. Soc. esp. Hist. nat.* 8 :188). ALGERIA: Col de Sfa. near Biskra (Finot 1896, *Ann. Soc. ent. Fr.* 64 :446); Bou-Saada, 8-10.x.1937; Biskra, 19.vii.1934 (*M.N. Korsakoff*). TUNISIA: Gafsa (*G. C. Champion*). SPAIN: Sevilla (I. Bolivar 1898, *Ann. Soc. Sci. nat. Porto* 6 :72, *sep. repr.*).

Algerian specimens are somewhat larger than the Canarian ones and have, generally, better pronounced L.1 fascia on the elytra. I have not seen any Spanish specimens.



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FIG. 2.—Distribution of subspecies of *S. notabilis* (Walk.).

### 2. *S. notabilis laterilis* subsp. n.

*Description.* Does not differ from *S. n. notabilis*, except in the colour of the wing disc which is brick-red, instead of light-red.

*Type locality.* British Somaliland, Long. 42° 00' E., Lat. 10° 35' N., 4500 ft.

*Distribution.* ANGLO-EGYPTIAN SUDAN: Jebel Teign. N. Darfur. ix.1934, 3 ♀♀; Khor Tameik, 30.ix.32, 1 ♂ (*R. C. M. Darling*); Shendi, Ben Naga, ix.1931, on rocky ground on hill-side, 1 ♀ (*H. B. Johnston*). ERYTHREA: Massawah, 1 ♀. BRITISH SOMALILAND: Somali, 1 ♀ (*Miss P. Gillet*); Long. 45° 50' E., Lat. 10° 35' N., 4500 ft., rocky and stony ground, practically no vegetation, 33 ♂♂ (including the type), 14 ♀♀ (*R. H. Taylor*).

### 3. *S. notabilis pallipes* subsp. n., plate 1, fig. B.

*Description.* Differs from *S. n. notabilis* by somewhat larger size, relatively longer elytra, wide and white L.2, better defined D.3, but particularly by the ivory-white hind tibia, without any trace of reddish colour.

*Type locality.* British Baluchistan, Gwal, 6000 ft.

*Distribution.* E. IRAN: Khorasan province, 1928, 1 ♂ (*Ofshar*). BRITISH BALUCHISTAN: Ormara hill, 14.v.1933, "frequent," 1 ♂; Yahrig, Sibi district, 30.vii.1931, 1 ♀ (*M. Sharif*); Mach, Bolan pass, 3000 ft., 27.ix.1930, 1 ♂, 2 ♀♀ (*W. Jf. Evans*); Pechi, 7500 ft., 1.vi.1931, 1 ♀; Gwal, 6000 ft., iv.1931, 1 ♂, type (*D. Harrison*). NORTH-WESTERN FRONTIER PROVINCE, INDIA: Malakend, 1 ♂ (*A. Begbie*). PUNJAB: Khewra, Salt Range, 24.ix-x.30, 7 ♂♂, 7 ♀♀; Kallar Kohar, Salt Range, 20-21.x.30, 1 ♂; Chon, 10 in. from Kaura, 15-21.x.30, 1 ♂, 1 ♀ (*S. L. Hora and H. S. Pruthi*); Campbellpur, vii.1885, 1 ♀.

### 4. *S. notabilis cinctipes* subsp. n., text-fig. 1, C.

*Description.* This may well be considered a distinct species, as it differs from all other subspecies in smaller size, but more robust habitus, in frontal ridge more rounded in profile, in convex and rugulose pronotum, and in short and broad hind femur. In the elytral pattern there is a close agreement with *S. n. notabilis*, while the wing disc is bright rose-red. Hind tibia is light-red, with well defined white postbasal ring.

*Type locality.* Nirwan, Pachham Islds., Cutch, W. India, x.1935, 2 ♂♂, including the type, 1 ♀ (*C. McCann*).

A paratype will be deposited in the museum of the Bombay Natural History Society.

### 5. *S. notabilis blanchardiana* (Saussure 1888), plate 1, figs. C and D.

1888. *Quirogueria brullei* var. *blanchardiana* Saussure, *Addit. Prodr. Oedipod.* :35

*Description.* This subspecies is remarkable for a striking sexual dimorphism. The male is very similar in size and coloration to *S. n. notabilis*, except that the wing disc is of a paler shade of red and becomes distinctly bluish close to the anal margin, while hind tibia is orange-red. The female, on the other hand, is relatively very large and long-winged, with the wing base pale yellow becoming bluish close to the anal margin, and the wing fascia relatively very broad; hind tibia as in the male. Elytral pattern in both sexes is characterised by the absence of L.1, L.2, D.3 and D.4, so that the elytron is divided into two parts, the whole basal half being greyish-brown, and the apical half hyaline, with few small brown-margined cells; sometimes there is a condensation of such cells near the apex forming an incomplete D.4.

*Type locality.* Saussure has described this insect from Bombay (Paris Museum; probably, a case of mislabelling) and Aden (British Museum), and I select here one female in the British Museum labelled Aden, as the type.

*Distribution.* ARABIA: Hedjaz, Yemen, Aden, Lahj, Muscat. PALESTINE: Aingeddi, Wadi Kelt, Jerusalem.

Palestine specimens are conspicuously smaller than the Arabian ones.

*O. S. notabilis brunneri* (Saussure 1884), plate 1, fig. E.

1884. *Scintharieta brunneri* Saussure, *Prodr. Oedipod.* : 121 (*partim*).

**Description.** This and the following subspecies form a very distinctive group, characterized by slender habitus and wings yellow in both sexes, with a broad fascia. The present subspecies has the elytra with all light and dark fasciae distinct, but not sharply defined, and differs from the following also in dirty-white hind tibiae.

**Type locality.** Described by Saussure from mixed material, originating from Shahrud in the Elburs mountains of northern Iran and from Ordubad in the Araxes valley. I designate Shahrud as the type locality of this subspecies, while the Ordubad specimens should be referred to the next one.

**Distribution.** IRAN: Shahrud, 1 ♂, 1 ♀ (*A. N. Kiritschenko*). NORTH-WESTERN INDIA: Chitral, 20-28.vi.29, 2 ♂♂; Shishi river, between Tar and Drosh, Chitral, 6-10.ix.29, 3 ♂♂ (*B. N. Chopra*). KASHMIR: Hunta, N. Kashmir, 7500 ft., 29.viii.13, 1 ♀ (*R. W. G. Hingston*).

The Kashmir female is referred here with some hesitation, as it has less distinctly fasciated elytra and has lost its hind tibiae; it may represent a distinct subspecies, but more material is necessary to decide the point.

7. *S. notabilis miramae* subsp. n., plate 1, fig. F.

1884. *Scintharieta brunneri* Saussure, *Prodr. Oedipod.* : 121 (*partim*).

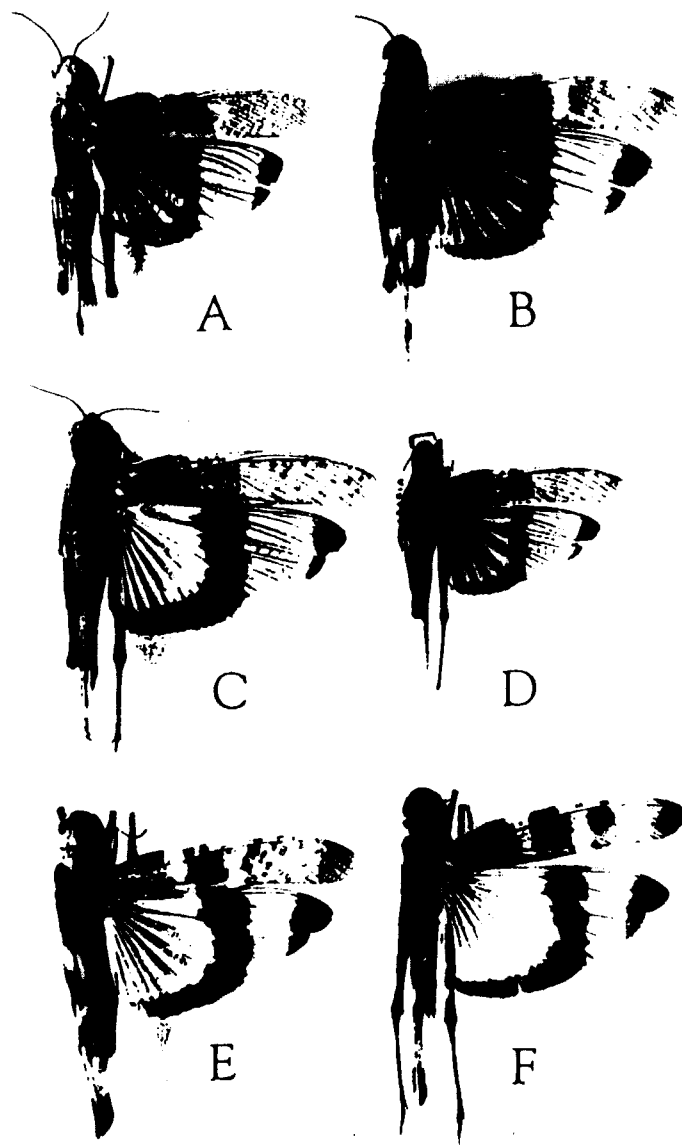
**Description.** Miran has already remarked (1938, *Trav. Inst. Zool. Acad. Sci., Baku* 8 : 46) that the Ordubad specimens of *S. brunneri* differ from the Iranian ones by more slender habitus, more brilliant yellow wing disc and by the sharply defined and strongly contrasted elytral fasciae, the dark ones being almost black, while the light are pure white. Hind tibiae are also of a darker shade than in the typical subsp. *brunneri* from Shahrud. I have, therefore, much pleasure in naming this remarkable subspecies after Miss E. Miran in recognition of her expert assistance in my earliest orthopterological studies, and of her outstanding work on Palearctic Orthoptera.

**Type locality.** Ordubad, Araxes valley (formerly Arineiin, now Nakhichevan Republic).

**Distribution.** ARMENIA: Ordubad, 4.vii.1933, 1 ♂, type; 9.vii.1933, 1 ♀ (*D. Znoiko*); Ordubad, 1 ♂ (Vienn Museum, Brunner von Wattenwyl collection); McGry, Astazur (Makarian, 1930, *Bull. Univ. Erivan* 5 : 297).

General distribution and variation of *S. notabilis*.

It will be seen from the map (fig. 2) that the distribution area of *S. notabilis*, with all its subspecies, stretches in a latitudinal belt from the Canary Islands to north-western India. This belt is, however, very discontinuous and consists really of several more or less isolated areas coinciding with systems of old eroded mountains fringing the deserts of the Ermiian zone. It is with this type of mountain that *S. notabilis* is connected ecologically, as it always occurs on bare stony, or gravelly slopes of strongly eroded hills, with very scanty vegetation. From the ecological point of view, *S. notabilis* should be classified as typically saxicolous (Uvnrov, 1938, *Mém. Soc. Biogéogr.* 6 : 47), while from the point of view of origin, it belongs to the stock which I have called Lemurian (*tom. cit.* : 252).



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Subspecies of *Scintharista notabilis*.

The known distribution of the subspecies of *S. notabilis* is of great interest from the point of view of their respective divergence from the more primitive group, which includes the red-winged subspecies without pronounced sexual dimorphism. The first amongst them are *subsp. notabilis* and *subsp. lateritia*, which are very closely allied, but inhabit two widely separated areas of Africa. On purely ecological grounds, there are strong reasons for expecting the species to occur also in the intervening area on the isolated mountain groups such as Tibesti, Hoggar, etc., and it would be of interest to investigate in detail the respective areas of the western *notabilis*, and the eastern *lateritia*. The third subspecies of this primitive group is *subsp. pallipes* of Baluchistan and north-western India, which is separated from the other two by the Arabian peninsula, inhabited by the very distinct and most strongly dimorphic *subsp. blanchardiana*. This latter presents exceptional interest, both zoogeographically and genetically. From the distributional point of view, it is certainly surprising to find the two sides of the Red Sea populated by two widely distinct subspecies, since the fauna of the low coastal mountain ranges is generally almost identical on the African and the Arabian side. From the evolutionary point of view, *subsp. blanchardiana* is remarkable for its male keeping very close to the more primitive type, while the yellow-winged female represents a striking divergence from it. Since there is no evidence of any substantial environmental difference between the two sides of the Red Sea, the divergence of *blanchardiana* can only be attributed to isolation due to the formation of the Red Sea rift.

The latter group of subspecies comprises the two north-eastern ones, characterised by the yellow wings of both sexes. One of them, the *subsp. brunneri*, populating Irmi, Chitral and, probably, Kashmir, is fairly close to the ancestral type of elytral pattern, while *subsp. miramae*, restricted in its distribution to the Araxes valley, represents the extreme expression of the fasciated pattern.

The remaining *subsp. cinctipes*, of the Cutch peninsula in India, constitutes a group of its own. It is close to the primitive type in the pattern and coloration, but is strongly specialised in its morphology, tending in the direction of the closely allied genus *Chlochora*.

## EXPLANATION OF PLATE 1.

Subspecies of *Scintharista notabilis* (Walker 1870).

- FIG. A. *S. n. notabilis* (Walker) 1870, ♀, Gran Canaria.  
 B. *S. n. pallipes* subsp. n., ♀, type, Baluchistan.  
 C. *S. n. blanchardiana* (Saussure 1888), ♀, Arabia.  
 D. *S. n. blanchardiana* (Saussure 1888), ♂, Arabia.  
 E. *S. n. brunneri* Saussure 1884, ♀, Shahrud, Irmi.  
 F. *S. n. miramae* subsp. n., ♀, paratype, Ordubad, Araxes valley.