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AN ATTEMPT AT A NATURAL CLASSIFICATION OF CERTAIN ZOSTEROPIDAE OF THE INDO-AUSTRALIAN ARCHIPELAGO

by

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The family of the Zosteropidae encloses, besides the very large and uniform genus *Zosterops,* a number of aberrant forms, especially in the East Indian Archipelago, that, though doubtless closely related to *Zosterops,* are too distinct to be united with this genus without objection.

Several authors have engaged themselves with the problem of the classification of these forms, without arriving at a definite conclusion (cf. Hartert, 1897, *Lophozosterops*; Stresemann, 1940, p. 66, *Pseudozosterops*). The inclusion of many of these forms in the genus *Zosterops,* as propagated by Hartert, and by Chasen (1935), is no final solution either, and later workers, such as Delacour & Mayr (1946), Delacour (1946), and Voous (1948), investigators who are certainly not in favour of unnecessary splitting of genera, place several species in a separate genus, *Apoia* (*A. goodfellowi, A. javanica, A. squamifrons*).

In the present paper a preliminary effort is made to arrive at a natural classification of these forms.

I am well aware that the recognition of several monotypic genera, as here proved necessary, is not attractive to ornithologists, but the alternative suggested by Stresemann (1940), and put into practice by others, to unite all these species with *Zosterops,* seems more objectionable, not only because of the disturbance in the homogeneity of the compact genus *Zosterops,* but also because of the fact that the relations that certainly do exist between several of the "aberrant" forms would be completely obscured by such an act.

The existence of these relations has not always been clearly recognised, as shown by the diverging generic names used for certain species.

It would lead to useless repetition to give complete descriptions of all the

genera and species discussed, hence only those characters are recorded that are of importance to the present review.

The monotypic genera *Chlorocharis* and *Hypocryptadius* are not here discussed, for their validity is now generally recognised. Moreover, concerning the first named genus, Harrison & Mees are preparing a separate publication.

Genus **Lophozosterops** Hartert

Lophozosterops Hartert, Nov. Zool., vol. 3, 1896, p. 567. Type: *L. dohertyi* Hartert.
Oreosterops, Hartlaub (nec Bp.), Journ. f. Orn., vol. 13, 1865, p. 26. Type: *Sylvia javanica* Horsfield.

Distinct from *Zosterops* by a dirty white or pale yellow throat, combined with pale yellow (in one species, *L. pinaiae,* grey) under side. When in *Zosterops* the belly, and especially the flanks, are yellow, the throat is always yellow too [1]).

Large, length of wing generally exceeding 60 mm, tail 63-73 % of length of wing. Upper parts olive green, or greyish green, head generally differently coloured; feathers of crown uniformly coloured, or mottled, in the latter case with white shaft-streaks. Eye-ring wide to very narrow, always present.

Most species occur exclusively in the mountains.

Distribution of the genus: Java, Bali, Soembawa, Flores, Celebes, and Ceram.

In the genus the following 5 species may be included: *L. javanica, L. superciliaris, L. dohertyi, L. squamiceps, L. pinaiae.*

Lophozosterops javanica (Horsfield)

Sylvia javanica Horsfield, Trans. Linn. Soc. London, vol. 13, 1821, p. 156 — Java.

Mantle olive green, head uniform ashy grey, forehead yellowish white, throat dirty whitish grey, remainder of under parts pale yellow. In the nominate race there is a yellowish stripe over the eye, that does not occur in the races *frontalis* and *elongata.* Immature birds have a faint greenish wash over the grey of the crown. Length of the tail in 11 specimens of *elongata:* 65.1-73.1 %.

L. javanica is the type of *Oreosterops* Hartlaub, a name accepted by Stresemann (1931), Rensch (1931), and more recently for instance by Mayr

1) In this connexion I may point to Stresemann's (1931) remarks on the lipochrome of the under parts, though in most cases the genetical base of this coloration certainly is more complicated than Stresemann, and Murphy (1929), imagined at that time (cf. Mees, 1951).

(1944) and van Bemmel (1948). The name is preoccupied by *Oreosterops* Bonaparte, 1854, a synonym of *Zosterops* (type *Z. montana* Bp.), as set forth by Stresemann (1939).

Hoogerwerf (1947) believed that *L. j. elongata* could not be distinguished

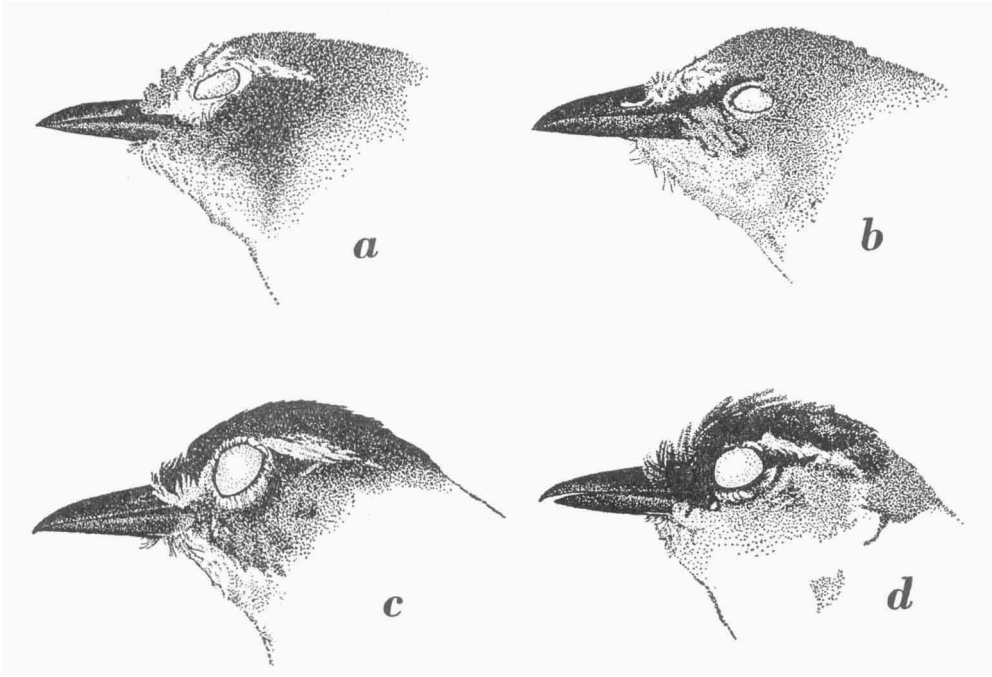

Fig. 1. a, *Lophozosterops javanica javanica* (Horsf.), superciliary stripe present, black loral line absent; b, *L. javanica elongata* (Stres.), superciliary stripe absent, black loral present; c, *L. superciliaris superciliaris* (Hart.) superciliary stripe pronounced; d, *L. dohertyi subscristata* Hart., resembling *L. superciliaris*. × 1½.

from the nominate race, but his conclusions were based on Chasen's (1935) erroneous statement [1]) that *elongata* should occur in East-Java. Hoogerwerf compared skins from Tengger and Idjen, that are indistinguishable from

1) A single specimen from Mt. Tengger in the Leiden Museum belongs to *javanica* (it was recorded under that name by van Oort (1911)), as evidently do most specimens examined by Hoogerwerf.

Chasen (1935), Kuroda (1933), and Stresemann (1931) probably based their records of East-Java on the paper of Robinson & Kloss (1924). There may be an influence of *elongata*-characters in eastern Java, or Robinson & Kloss may have misidentified their birds, but certain is that topotypical specimens of *elongata* are quite distinct from *javanica*, though they may be inseparable from *frontalis*.

As the question has no bearing on the affinities of *L. javanica* as a species, it may rest for the moment.

javanica, having a pronounced stripe over the eye (fig. 1a). But in the beautiful series from Bali in the Leiden Museum (collected by von Plessen), there is no trace of a superciliary stripe (fig. 1b), and these skins agree with those of *frontalis* from West-Java, as correctly stated by Stresemann (1913).

I doubt if Bali-birds do really have longer beaks than *frontalis,* but the material at hand is insufficient to decide this with certainty. If the character of the bills does not hold, perhaps other differences between *elongata* and *javanica* may be found.

The race *frontalis* has a rather limited distribution, it occurs in the westernmost part of Java only (Mt. Karang in Bantam; Mt. Pangrango-Gede); birds from Tjinjiroean, south of Bandoeng, evidently belong to *javanica,* whereas specimens from Mt. Tangkoeban Prahoe, north of Bandoeng, can also be included into this race, though they sometimes show a slight influence of *frontalis*-characters. Even on Mt. Pangrango specimens of *javanica* occur, but very rarely (Bartels, 1906).

The vertical range is large, from about 1000 m altitude up to the highest summits (Hoogerwerf, 1948 and 1950). Hartert (1896a) records specimens of *elongata* from an elevation of 2000-3000′, which seems rather low. On the slopes of Mt. Gede I observed the species from 1500 m upwards; here it is one of the most common birds, as was known already to Hartlaub (1865). Delacour's (1947) remark that the species is rare must be a slip.

Lophozosterops superciliaris (Hartert)

Zosterops superciliaris Hartert, Nov. Zool., vol. 4, 1897, p. 172 — South Flores.

Distinct from *L. javanica* by having the crown of the same colour as the mantle, whereas the ear coverts are grey, and a superciliary stripe is present that has the same colour and shape as in *javanica* (fig. 1c). This character, to which may be added the complete similarity in size and proportions (tail in two specimens 68.7 % and 72.9 % of length of wing respectively), and the fact that *L. superciliaris* is a mountain bird—freely occurring at a slightly lower level than *L. javanica,* namely from 1000 to 1400 m according to Rensch (1931)—almost prove that the species is closely related to *javanica,* an opinion already brought forward by Rensch.

Distribution: Flores (*superciliaris*) and Soembawa (*hartertiana*).

Lophozosterops dohertyi Hartert

Lophozosterops dohertyi Hartert, Nov. Zool., vol. 3, 1896, p. 568 — Volcano of Tambora, "Sambawa" (= Soembawa).

The greyish mantle and the elongated brownish crown feathers with their broad white shaft streaks distinguish this species rather sharply from the

former two. However, the feathers on the crown of *L. superciliaris* are also slightly elongated, though not to such an extent that they form a crest. Like *L. superciliaris,* both races of *L. dohertyi* have a pale yellow superciliary stripe (fig. 1d), and there can be no doubt that the two are related.

The general dimensions and the relative length of the tail (64.6-72.6 %) are the same as in the other species of the genus.

Contrary to the other species, *L. dohertyi* does not seem to be exclusively a mountain bird. Rensch (1931) observed it between 600 and 1100 m altitude, but the collecting of a specimen on the tiny islet of Satonda, close to the north coast of Soembawa (Hartert, 1896b), indicates that it also occurs in the true lowlands.

Distribution: Soembawa (*dohertyi*) and Flores (*subcristata*).

Lophozosterops squamiceps (Hartert)

Chlorocharis squamiceps Hartert, Nov. Zool., vol. 3, 1896, p. 70 — Bonthain Peak, Celebes.

There exists a striking similarity between this species and the races of *L. javanica* without superciliary stripe (*frontalis* and *elongata).* Dimensions and relative length of the tail are identical whereas the vertical distribution and habitat (as far as can be judged from Heinrich's notes in Stresemann (1940)) are about the same.

The major difference between the two species is in the feathers of the crown, that are of one colour in *javanica,* and more-coloured in *squamiceps.* It is on the strength of this character that Stresemann (1931, 1936, 1940) placed *L. squamiceps* in the artificial genus *Pseudozosterops,* whereas *L. javanica* originally was brought to *Oreosterops,* and subsequently to *Apoia* (cf. Stresemann, 1939).

The remarkable divergence in the crown feathers of the different races deserves a closer examination. All races are figured on plate I, that should be consulted together with the following short descriptions of the various types of crown feathers:

Plate IV fig. 1: *L. s. squamiceps* (Bonthain Peak): White shaft-streaks, white edges to the tips, remainder dark sepia, very dark outwards, lighter to the centres of the feathers; basal parts grey. Juveniles of all races have the sepia tinge with a wash of olive green (as in *L. javanica*). Tail index (6 specimens) 64.3-70.4 %.

Plate IV fig. 2: *L. s. stachyrina* (Latimodjong Mts.): Broad white shafts, no differently coloured edges to the feathers that, consequently, show very dark, as they are all sepia to the tips. Tail index (3): 63.0-71.2 %.

Plate IV fig. 3: *L. s. striaticeps* (Central Celebes): White shafts narrow,

though much more pronounced than in *squamiceps,* sharply limited. Sepia as in the other races, with very narrow greyish edges. Tail index (9): 64.1-68.8 %.

Plate IV fig. 4: *L. s. analoga* (Mengkoka Mts.): Entirely like *squamiceps.* Tail index (6): 67.8-71.9 %.

Plate IV fig. 5: *L. s. heinrichi* (Matinan Mts.): Shaft-streaks inconspicuous, yellowish-white; feathers greyish-sepia, with broad grey edges. Tail index (10): 64.0-71.1 %.

Plate IV fig. 6: *L. s. stresemanni* (Sapoetan, Minahassa): Conspicuous white shaft-streaks, very pronounced, because of the inner parts of the feathers also being white. Sepia as in the other races, broadly bordered with grey. Tail index of type specimen: 69.4 %.

From this survey it is evident how great the variation in these feathers is, even within one species. The race *heinrichi* with its nearly plain grey head is very close to *L. javanica.* In *L. javanica,* on the other hand, the yellowish-white feathers of the forehead sometimes show a central sepia spot. A close relation between *L. squamiceps* and *L. javanica* is apparent, *L. s. heinrichi* being more or less intermediate between *L. javanica* and *L. s. squamiceps.*

I further point to the fact that *L. dohertyi,* without doubt closely related to *L. superciliaris,* also has bicoloured crown feathers.

Distribution: Probably all high mountains of Celebes; hitherto the above listed six races are known, each from the single mountain-group mentioned behind its name.

Lophozosterops pinaiae (Stresemann)

Oreosterops pinaiae Stresemann, Bull. B. O. C., vol. 31, 1912, p. 5 — Gunung Pinaia, Middle Ceram, 7500 feet.

The similarity between this robust white-eye and *L. javanica frontalis* and *elongata* is so striking that there can be no doubt about their affinity.

L. pinaiae can be distinguished from *javanica* by its larger size (though with similar proportions; tail index in one specimen 65.3 %), the wide eye-ring, and the pale grey instead of yellowish under side. The upper side, with the olive green mantle, the plain grey head, and the yellowish white forehead, is practically identical with that of *L. j. elongata.*

This species, like most others of the genus, is a typical mountain bird (cf. Stresemann, 1912 and 1914).

Genus **Madanga** Rothschild & Hartert

Madanga Rothschild & Hartert, Bull. B. O. C., vol. 43, 1923, p. 117. Type: *Madanga ruficollis* Roth. & Hart.

Only species: **Madanga ruficollis** Rothschild & Hartert

Madanga ruficollis Rothschild & Hartert, Bull. B. O. C., vol. 43, p. 118 — Wa Fehat, Buru, 2700 feet.

Distinct from all other genera b yits orange throat, sharply defined against the dark grey remainder of the under parts, and by the narrow and pointed rectrices, of which the outer pair is of a very pale colour.

The species occupies a blank spot in the area of the genus *Lophozosterops*. Though the bright olive green mantle and the grey head are reminiscent of those of *Lophozosterops*, the differences are so striking that the species cannot be included in that genus. An additional difference is that of the wing formula, that in *Madanga* is: 4> 3 = 5> 6 = 2> 7> 8> 9> 10, whereas in all species of *Lophozosterops* the second primary is shorter than the seventh.

It is, of course, difficult to decide whether from a phylogenetical point of view, *Madanga* is indeed less closely allied to the species of *Lophozosterops* than these are to each other. Isolation of the presumably small population may have caused it to deviate faster from its ancestral type than the species of the larger islands. However this may be, our genus concept of necessity must be morphological (though it may be strengthened by ecological and ethological arguments when these are available), and as such, there is no question as to the validity of *Madanga*.

Distribution: Boeroe, where it is exclusively known from the type locality.

Genus **Tephrozosterops** Stresemann

Tephrozosterops Stresemann, Mitt. Zool. Mus. Berlin, vol. 17, 1931, p. 234. Type: *Tephras stalkeri* Og.-Grant.

A single species: **Tephrozosterops stalkeri** (Ogilvie-Grant)

Tephras stalkeri Ogilvie-Grant, Bull. B. O. C., vol. 25, 1910, p. 90 — Gunung Kakopi, M. Ceram.

Van Bemmel (1948) does not recognise the genus, unfortunately without comment, though probably his opinion was based on Stresemann's (1931) statement that no structural differences from "*Oreosterops*" (= *Lophozosterops)* exist. In this connexion it should be kept in mind that there are no differences of a structural nature between *Lophozosterops* and *Zosterops* either. In coloration *Tephrozosterops* is so distinct that it certainly reserves generic rank.

It seems to be not exclusively a mountain bird; in Leiden there are specimens collected by Stresemann near Manusela, Central Ceram, at an

altitude of 2000-2500', whereas van Dedem collected one at Ahiolo, West Ceram, at about 700 m.

Genus **Apoia** Hachisuka

Apoia Hachisuka, Contributions to the Ornithology of the Philippines, vol. 2, 1930, p. 205. Type: *Zosterops goodfellowi* Hartert.

One species: **Apoia goodfellowi** (Hartert)

Zosterops goodfellowi Hartert, Bull. B. O. C., vol. 14, 1903, p. 13 — Apo Volcano, Mindanao, 8000 feet.

Whole upper side dark olive green, crown of the same colour as the back. Dirty white throat, rather sharply bordered against the yellow remainder of under parts. Forehead and loral region sepia. Eye-ring greatly reduced.

Distinct from *Zosterops* by its white throat, combined with a yellow belly, and from most species of that genus also by its large size. Distinct from most species of *Lophozosterops* by having mantle and crown of the same colour, and by the sharply defined white throat.

This genus is doubtless very close to *Lophozosterops,* and should probably be united with it. That I maintain it for the moment is because I have examined but a single skin, that had damaged wings, so that no tail index and wing formula could be worked out.

The dark red iris (note of Goodfellow on label of the specimen examined) seems rather distinct, but *Lophozosterops superciliaris* is also reported to have a dark red iris (Rensch, 1931).

A mountain-inhabiting species, that has a vertical range of about 5000 to 9000 feet (Mearns, 1909).

Distribution: Mindanao; only known from Mt. Apo (*goodfellowi*) and Mt. Malindang (*malindangensis*).

Genus **Oculocincta,** new genus

Type and only species: *Zosterops squamifrons* Sharpe.

Oculocincta sqamifrons (Sharpe)

Zosterops squamifrons Sharpe, Ibis (6), vol. 4, 1892, p. 323 — Mt. Dulit, N. W. Borneo.

Distinct from *Zosterops* by having the frontal feathers white-edged, by the olive brown upper parts, and the pale yellow under parts. Distinct from *Apoia* by the same characters, and by the much smaller measurements. Distinct from *Lophozosterops,* apparently its nearest ally, by the olive brown

upper parts, with mantle and crown of the same colour, by the much smaller measurements, and by the relatively shorter tail.

Sharpe (1892) was already puzzled by this species, that generally was placed in *Zosterops* (Finsch, 1901; Chasen, 1935). Stresemann (1931, 1940) brought it to *Pseudozosterops,* whereas Delacour (1946) placed it in *Apoia.*

The differences from these genera are so striking that the creation of a separate genus for the species seems the only logical solution.

The measurements of 3 specimens in the Leiden Museum are: wing 50, 50, 50 mm, tail 28, 30.5, 31 mm, index 56, 61, 62 %.

The species does not seem to exclusively inhabit high mountains, for Büttikofer (1900) collected it at an altitude of 600 m.

Chasen (1935) records as type locality Mt. Kinabalu; this should be Mt. Dulit. Delacour's (1947) remarks: "A rare species of Mt. Kinabalu" is of course incorrect.

Distribution: Known from the hills and mountains of North Borneo, Sarawak, and West Borneo.

Genus **Heleia** Hartlaub

Heleia Hartlaub, Journ. f. Orn., vol. 13, 1865, p. 26. Type: *Heleia Mülleri* Hartlaub.

Pseudozosterops Finsch, Tierreich, 15. Lief., Zosteropidae, 1901, p. 46. Type: *Heleia Mülleri* Hartlaub.

Characterized by dark crown feathers with broad pale edges. Differs from *Lophozosterops* by not having white shafts to these feathers. Also distinct by its rather heavy and not black, but greyish or brownish beak [1]). Relative length of tail perhaps slightly greater, 72-75 % in four specimens (3 *mülleri,* 1 *crassirostris*).

The genus is generally recognised, only Sharpe (1884) and Hartert (1898) doubted its validity.

Finsch (1901) rejected the name *Heleia* that he believed to be a misprint for *Helia,* a name preoccupied by *Helia* Hübner. Hartlaub does not explain the derivation of *Heleia,* but writes to have had much trouble with the correct classification of the type species. Hence, it is possible that the word heleos, ἡλεός, confused, was in his mind. However this may be, according to article 35 of the International Code of Zoological Nomenclature, a genus name, once published, cannot be rejected on account of its differing in one letter from an other genus name.

Both species of the genus inhabit the lowlands.

Distribution: Soembawa, Flores, and Timor.

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1) Rensch (1931) records the bill in *H. crassirostris* as "hellgrau". In the skins, the bills are in both species brownish.

Heleia mülleri Hartlaub

H[eleia] Mülleri Hartlaub, Journ. f. Orn., vol. 13, 1865, p. 26 — Timor.

Very remarkable is the speckled breast, a character not found in any other species. Juvenile specimens show these speckles only faintly, and have the feathers of the crown also less mottled.

Collected by Everett near Atapupu (Hartert, 1898), and by Stein at Koepang (sea level) and Tjamplong (170 m), in the typical lowlands (Mayr, 1944).

Distribution: known from Western Timor only.

Heleia crassirostris (Hartert)

Zosterops crassirostris Hartert, Nov. Zool., vol. 4, 1897, p. 172 — South Flores.

The total absence of yellow in the plumage distinguishes this species rather sharply from *H. mülleri*; yet there is little doubt about their relation. Dimensions are the same in the two species.

Vertical range according to Rensch (1931) 0-800 m.

Distribution: Flores (*crassirostris*) and Soembawa (*junior*).

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PLATE IV

The heads of the six known races of *Lophozosterops squamiceps*, photographed from above in order to show the differences of the crown feathers. Enlargement nearly 3 ×. For a further discussion, see text.

Fig. 1. *L. s. squamiceps* (Hartert), ♀, 31-VIII-1931, Lambasang, Lompobatang (Bonthain Peak), 1100 m, G. Heinrich leg. Zool. Mus. Berlin nr. 34.2208.

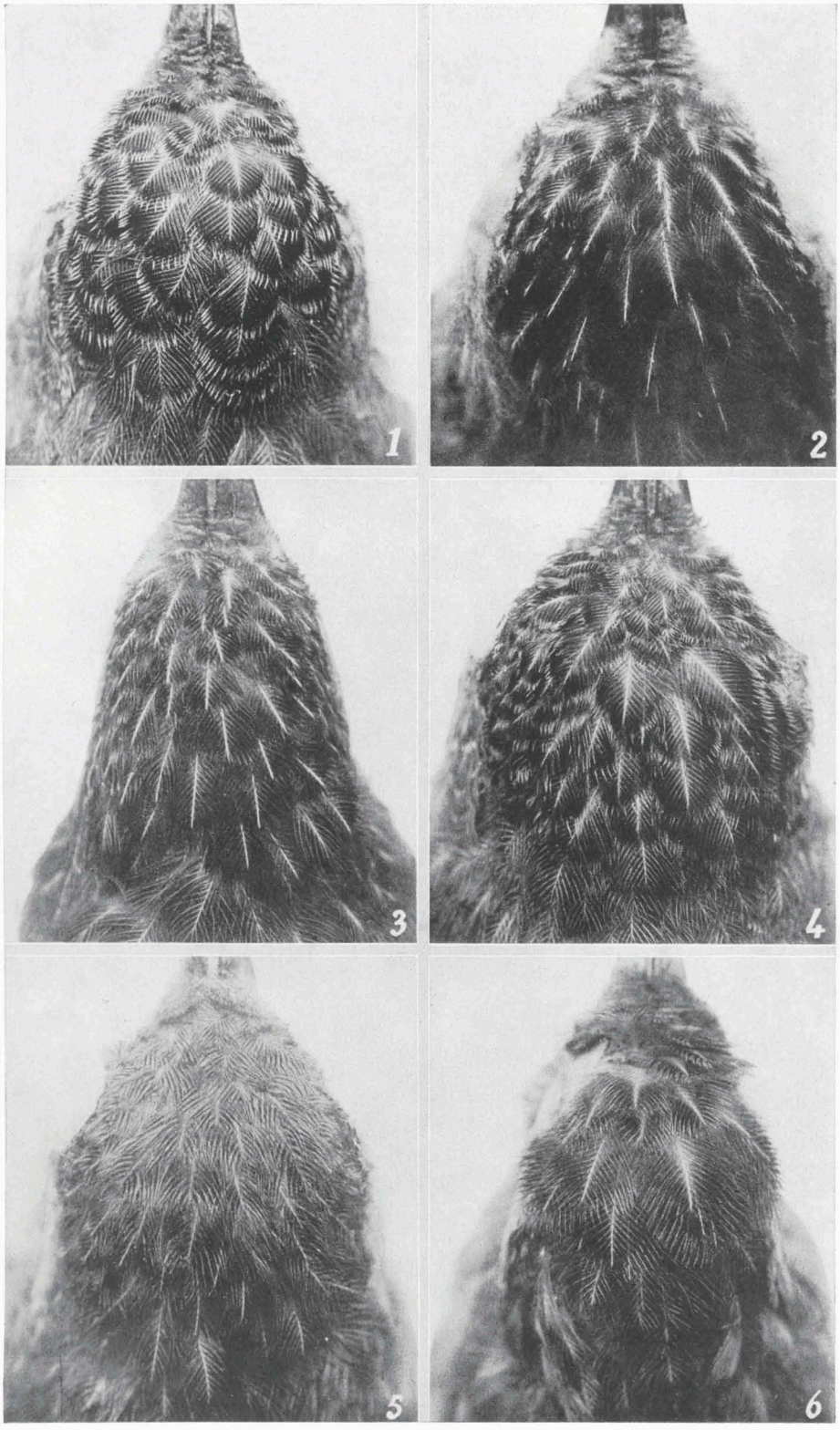
Fig. 2. *L. s. stachyrina* (Stres.), ♂, 28-VII-1930, Latimodjong, 1500 m, G. Heinrich leg. Zool. Mus. Berlin nr. 34.2156.

Fig. 3. *L. s. striaticeps* Riley, ♂, 2-XI-1917, Besoa, H. C. Raven leg. Zool. Mus. Berlin nr. 26.4.

Fig. 4. *L. s. analoga* (Stres.), ♀, 23-XII-1931, Tanke Salokko, Mengkoka Geb., 1500 m, G. Heinrich leg. Zool. Mus. Berlin nr. 34.2200.

Fig. 5. *L. s. heinrichi* (Stres.), ♂, 9-XI-1930, Ile-Ile (N. Celebes), 1700 m, G. Heinrich leg. Zool. Mus. Berlin nr. 34.2159.

Fig. 6. *L. s. stresemanni* (van Marle), ♂ (type), 18-IX-1939, gebergtebosschen Sapoetan bij Toemaratas, 1300 m, (Langoan), Minahassa, L. Coomans de Ruiter leg. Coll. van Marle nr. 141 (Coll. van Marle-Coomans de Ruiter nr. 980).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