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The Golden-spectacled Warbler *Seicercus burkii* – a species swarm[1)] (Aves: Passeriformes: Sylviidae) Part 1

With 3 Plates, 19 Figures and 3 Tables

JOCHEN MARTENS, SIEGFRIED ECK, MARTIN PÄCKERT & YUE-HUA SUN

Contents.

Abstract. The Golden-spectacled Warbler (*Seicercus burkii* auct.) of the Himalayas, China and Myanmar is not a uniform species but rather comprises a swarm of at least seven biospecies. These species are sympatric over large areas, but at certain sites have a strict vertically parapatric distribution without interbreeding ("paraspecies"). Hence only the criterion of ecological compatibility, which has long been used to identify independent species, does not apply to these *Seicercus* species. In China (Emei Shan, Taibai Shan) up to four species can coexist on a single mountain slope, in Myanmar (Mt. Victoria) three, and in Nepal two. The individual species are sharply distinguished by several independent characters in each case (voice, morphology, genetics) but in certain cases the morphological or vocal characters are not conspicuous (one case of each). Proportions of the large feathers and coloration and patterning (median and lateral crown-stripes, white markings on the outer rectrices, green and yellow tones on upper and lower surfaces of the body), voice (syntax, element forms and frequency range of the territorial songs, structure of the calls) and molecular genetics (high distance values of cytochrome b, 5–8 %) unambiguously distinguish all species. These characters also reveal phylogenetic relationships between the species. Plumage characters are very conservative in the whole species swarm and can be classified as plesiomorphic with reference to other characters. Territorial songs likewise appear conservative with respect to cytochrome b, but are very similar in two pairs of groups (*S. burkii* s. str. / *S. omeiensis*; *S. whistleri* / *S. valentini*) and for each of these are synapomorphic. *Seicercus omeiensis* **spec. nov.** is newly described here. It is discriminated from *S. valentini* acoustically and genetically and to a slight extent morphologically; from all other species it is also clearly discriminable morphologically. The following species are distinguished, all by separation from *Seicercus burkii* auct.: *S. burkii* (BURTON, 1836) s. str.

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Authors' addresses:
Prof. Dr. Jochen Martens, Dipl.-Biol. Martin Päckert, Johannes Gutenberg-Universität Mainz, Institut für Zoologie, Saarstraße 21, D-55099 Mainz (Germany)
Siegfried Eck, Staatliches Museum für Tierkunde, Forschungsstelle, A.-B.-Meyer-Bau, Königsbrücker Landstraße 159, D-01109 Dresden (Germany)
Asso. Prof. Yue-Hua Sun, Institute of Zoology, Chinese Academy of Sciences, Beijing 100080 (P. R. China)

Characterization of the species

Seicercus distinctus (La Touche, 1922) **stat. nov.** (Plate III)

Pure grey top of head with two broad black longitudinal stripes, also grey outside these stripes, which become broader posteriorly, back yellow-green, underside yellow with weak orange shading. Inner vanes of T6 and T5 (rarely, and then reduced, small field also on T4) with white. – In relation to the sympatric *valentini* distinctly smaller (see Fig. 2) and thinner-billed, wing-tip index distinctly lower, $\bar{x} = 13.5$ %, $s = 1.95$ ($n = 37$), cf. below; tail/wing index $\bar{x} = 84.4$ %, $s = 2.2$ ($n = 37$), top of head with greater contrast! In relation to *S.* "*latouchei*" (wing-tip index $\bar{x} = 18.2$ %, $s = 1.79$, $n = 12$; tail/wing index $\bar{x} = 78.2$ %, $s = 1.69$, $n = 12$) markedly shifted remiges and rectrices proportions. – Wing length: 23 males: 49.5–57 mm, $\bar{x} = 53.7$, $s = 2.09$; 8 females: 48.5–53, $\bar{x} = 51.3$, $s = 1.89$.
Calls (Fig. 9) known, song unknown.

Distribution (38 specimens checked): China: Shaanxi, Qinling Shan: Taibai Shan, W Sichuan (Taukwan in the Min Valley, Tatsienlu, foothills of Wa Shan), Yiu San / Kuangtung (XII); Lichiang / NW Yunnan, Mengtz / SE Yunnan (X, III, IV); – NE India: Lushai Hills (IV), Naga-Hills (VII, VIII); – Myanmar (Maymyo XII, Mt. Victoria 2000 m [VI] and 2600 m [V]), Lower Pegu; – Vietnam: Tonkin (IV); – Thailand: Tham Lot Cave, NE Mae Hong Son (III).

Seicercus valentini (Hartert, 1907) **stat. nov.** (Plate I, Figs. a–c)

Dark grey top of head with two broad, black, diffuse longitudinal stripes, back dull green, yellow underside in fresh plumage with tendency towards orange. Inner vanes of the T5 (at most the distal half) and T6 with white. Longest-winged form (up to 65 mm found), cf. Fig. 2. Massive, broad bill, relatively short. Wing-tip index $\bar{x} = 16.8$ % ($n = 11$), tail/wing index $\bar{x} = 82.7$ % ($n = 11$). – Material from the large range of distribution given by Watson in "Peters" exhibits such pronounced size differences, even among males alone, that the specimens could not all be *valentini*: e.g., one from Kuatun/NW Fujian with only 54 mm wing length. Our studies confirmed this. – Wing length: 11 males: 59–63, $\bar{x} = 60.8$, $s = 1.17$. According to Hartert (1907) and Bangs (1929) up to 65 mm.

Distribution (11 specimens checked): China: Shaanxi, Qinling Shan: Taibai Shan, Sichuan (Songpan, Emei Shan, Wa Shan).

Seicercus omeiensis **spec. nov.** (Plate I, Figs. d–f)

Preliminary comments: At Emei, at altitudes between 1270 and 2330 m, an atypical song form was recorded. Five skins, four of them song specimens, are available from 1850, 2100 and 2330 m. From 2310 m to 3099 m (summit of Emei) *S. valentini* with another song form was found (3 skins from 3000 and 3050 m). Much lower, between 800 and 1170 m, there lives a third form, here provisorily called *S.* "*latouchei*". It is distinguishable morphologically (see Fig. 3), has its own song and, like the other local "forms", is quite distinct genetically. It seems very likely that there is also a fourth song form still lower on the Emei (see section on Bioacoustics). – *S. omeiensis* is a pure example of a cryptospecies. On mor-

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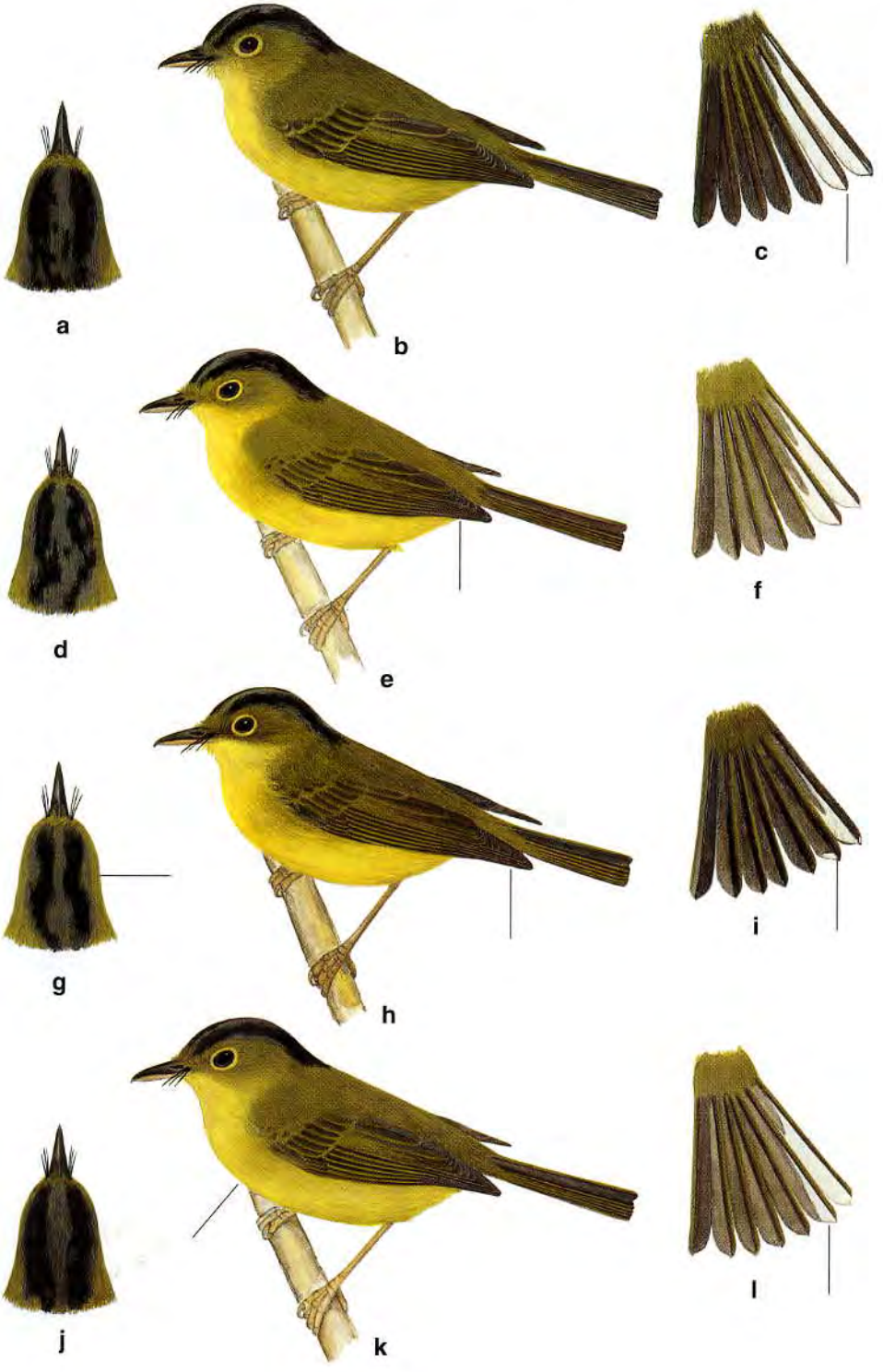
Plate I: The *Seicercus* species of Emei Shan, Sichuan, China. – a–c: *S. valentini*, 3000 m, male, VI (Mus. Dresden C 57055). – d–f: *S. omeiensis* spec. nov., holotype, 2330 m, male, VI (Mus. Dresden, C 57051). – g–i: *S.* "*latouchei*", g: 1050 m, male, VI (Mus. Dresden C 57058). – h–i: 1030 m, male, VI (Mus. Dresden C 57059). – j–l: *Seicercus* spec.?, male, 15.V.1915, leg. Weigold (Mus. Dresden C 23235). Original: K. Rehbinder.
Tafel I: Die *Seicercus*-Arten des Emei Shan.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phological grounds alone, with reference to the available material, it would not qualify as a species new to science.

Differential diagnosis: *S. omeiensis* is extremely similar morphologically to the *S. valentini* living at higher altitudes on the same mountain, but it is a more delicate looking bird, with thinner bill, shorter wings, different vocalizations and clear genetic differentiation.
Top of head dark grey with two wide, black, diffuse longitudinal stripes. Inner vanes of T5 and T6 with white, reduced to about one-third of the vane length on T5 (in 1 specimen [MAR 925], from 2100 m, white clearly more extensive on T5). Back coloration "Warbler Green" (RIDGWAY 1912: Pl. IV, 23 k), undersurface deep yellow, olive tint at the sides, very slight orange traces on the breast.

Measurements of *S. omeiensis* (n = 5: 4 males, 1 female) and *S. valentini* (n = 3) from Emei: wing length/wing-tip length/tail length/bill length/tarsus length:
omeiensis: male (holotype) 55/9/46.5/10.5/17.5 mm; – paratypes: male 59/10/49.5/10.5/19 mm; male >57/9/49/11/19 m; male 57/9/47.5/11/18.5 mm; female 53/8/41/10.5/18 mm.
valentini: male 59/10/50/11/18.5 mm; male 60.5/10/51.5/11/19.5 mm; male 61/10.5/50/10.5/19 mm. – Wing lengths combined: 4 males: 55–59 mm, $\bar{x} = 57.0$, s = 1.63 (1 female 53 mm).

Voice (Fig. 11e-z; Fig. 11o-z': song verses of the holotype): territorial song is a short warble of 6–11 elements. To many verse types of an individual male trills are added, calls Fig. 9f. See section on Bioacoustics (p. 301).

Molecular genetics: According to cytochrome b analysis *S. omeiensis* is clearly differentiated to all other sympatric *Seicercus* species. Genetic distances range between 6.9 % to *S. valentini*, 7.1 % to "*S. latouchei*" and 8 % to *S. distinctus*. For DNA sequences see Appendix, the sequence of the holotype will be available in the Gene Bank.

Holotype: male, China, Sichuan, Emei Shan, 2330 m, above Xixiang Monastery, 5.VI.1998 leg. J. MARTENS. No. C 57051, Staatliches Museum für Tierkunde, Dresden. Plate I, Figs. d–f.
Song recording and tissue sample: tape Nagra SN, China 1998 No. 13: 13.5–16.5 s (copy deposited with the Wildlife Section, British Library National Sound Archive, London, and the Tierstimmenarchiv, Humboldt-Universität, Berlin); – tissue sample MAR 922.
Wing length 55 mm, tail length 46.5 mm, bill length (to forehead feathers) 10.5 mm, tarsus length 17.5 mm.

Paratypes: Emei Shan, male, 1850 m, 27.V.1998, No. C 57052 (all C numbers refer to Museum Dresden); male, 2100 m, 6.VI.1998, No. C 57053; male, 2100 m, 7.VI.1998, now in the collection of the Chinese Academy of Sciences, Institute of Zoology, Beijing; female, 2100 m, 7.VI.1998, No. C 57054.

Distribution: China: Emei Shan 1270-2330 m, Taibai Shan 1450 m, 1950 m and 2100 m, record by voice (see Fig. 11e-z) and tissue samples (MAR 712, 713, 714, 715). – See section on Vertical distribution (p. 311) and Molecular Genetics (p. 314).

Plate II: *Seicercus* species of the Himalayas and from Mt. Victoria (Myanmar). *S. whistleri* and *S.* (spec.?) *nemoralis* may be geographic representatives and may be combined under a common species name later. – a–c: *Seicercus whistleri*, Bigu/Nepal, 3200 m, male, V (Zool. Staatssammlg. München 62.1054). – d–f: *S.* (spec.?) *nemoralis*, Mt. Victoria/Chin Hills, Myanmar, 2800 m, male, V (Mus. Naturkunde Berlin 39.646). – g–i: *S. burkii* s. str., Godavari, Kathmandu Valley/Nepal, 1450 m, male, X (Zool. Staatssammlg. München 62.1057). – j–l: *S.* (spec.?) *tephrocephalus*, Mt. Victoria/Chin Hills, Myanmar, 1400 m, III (Mus. f. Naturkunde Berlin 43.1651). Original: K. Rehbinder
Tafel II: Die *Seicercus*-Arten des Himalaya und eine Form vom Mt. Victoria, Myanmar. – *S. whistleri* und *S.* (spec.?) *nemoralis* sind möglicherweise geographische Vertreter, die unter einem gemeinsamen Artnamen vereinigt werden müssen.

Seicercus "latouchei" BANGS, 1929 (Plate I, Figs. g–i)

Mat grey top of head with two relatively narrow mat black longitudinal stripes. White on T6 not extensive and on T5 limited to the tip region. Wing-tip index high and tail/wing index low (see above under *S. distinctus*; for the birds from Emei see Fig. 3). – Wing length: 8 males: 54–61 mm, $\bar{x} = 58.3$, $s = 2.36$; females not available.

Distribution (checked material: 12 skins): China: N Sichuan (IV, V, VIII) and Emei Shan (V, VI), Sunjang (Guizhou Prov., Kweichow) (IV)*, Kiukiang/Jiangxi (IV), Kuatun/NW Fujian Prov. (Fukien) (IV), Mengtz/SE Yunnan Prov. (IX). – Records on the Taibai Shan at 1450 m (song record, Fig. 11a–d) and cyt b (tissue samples MAR 760, 761, 765). – See section on Molecular Genetics.

Note: A second bird found at Sunjang in March 1898, a female, has an interrupted yellow eye ring (like *intermedius*) and a relatively very long tail, tail/wing index = 83 % (like *omeiensis*). We have examined other problematic individuals from China, e.g. two extremely differently proportioned birds collected at Kwanhsien/Sichuan on 22. and 24.IV.1914. These specimens will be discussed in a separate paper.

Seicercus* (spec.?) *tephrocephalus (ANDERSON, 1871)
(Plate II, Figs. j–l (see also ANDERSON 1878, Plate L)

Top of head as contrasting as in *S. distinctus*, but crown somewhat mixed with green; inner vanes of the two outermost rectrices (T6, T5) with white. Undersurface greenish yellow (not orange). The undersurface coloration sharply distinguishes a series of this form from other forms/species.
Wing length: *S. tephrocephalus*: 6 males: 57–61 mm, $\bar{x} = 59.0$, $s = 1.89$. *S. distinctus* up to 57 mm.

Distribution (checked material: 13 skins): Myanmar: Chin Hills, Mt. Victoria (upper Burma). This distinct form very probably is the geographic representative of a still undescribed Chinese species, but presently cannot be linked to any other species or local form by voice or genetics. For the time being, its relations remain unsolved.

Seicercus* (spec.?) *nemoralis KOELZ, 1954 (Plate II, Figs. d–f)

Crown greenish, mixed with grey, two deep-black diffuse crown-stripes, undersurface deep orange (more intense than in any other form), inner vanes of T4–T6 with white.

All skins from Mt. Victoria/Chin Hills, although without sound records, can be assigned to three forms: (i) with dark upper head in a mixture of grey/green, deep orange undersurface, 3 tail feathers with white, wing length up to 59 mm, from altitudes between 2440 and 2800 m (III–V) (*nemoralis*); (ii) upper head altogether brighter, undersurface "lemon yellow", only 2 rectrices with white, wing length about as in (i) but tail relatively short, at 1400 m altitude (III) (*tephrocephalus*); (iii) upper head highly contrasting pure grey-black, undersurface yellow with slight tendency to orange, 2 rectrices with white (only exceptionally and reduced also on T4), smaller than in the two preceding (*distinctus*; V, VI).
This finding induced us to re-introduce the name *nemoralis* KOELZ, 1954, particularly because these birds from the upper levels of Mt. Victoria are consistent with those from the Lushai and the Naga Hills (NE India, the type locality of *nemoralis*). It appears conceivable that *nemoralis* is the somewhat aberrantly proportioned geographic representative of *S. whistleri* of the high-altitude Himalayas (see Fig. 4).

Measurements: *nemoralis:* wing-tip index 10–17.2 %, $\bar{x} = 13.1$, $s = 2.10$ ($n = 23$), tail/wing index 83–92.3 %, $\bar{x} = 86.9$, $s = 2.61$ ($n = 20$); wing length: 8 males: 50–59, $\bar{x} = 54.7$, $s = 3.53$; 7 females: 49–55, $\bar{x} = 52.3$, $s = 1.89$.
whistleri: wing-tip index 12.6–17.8 %, $\bar{x} = 14.8$, $s = 1.25$ ($n = 53$), tail/wing index 78.7–88.3 %, $\bar{x} = 83.6$, $s = 2.07$ ($n = 52$).