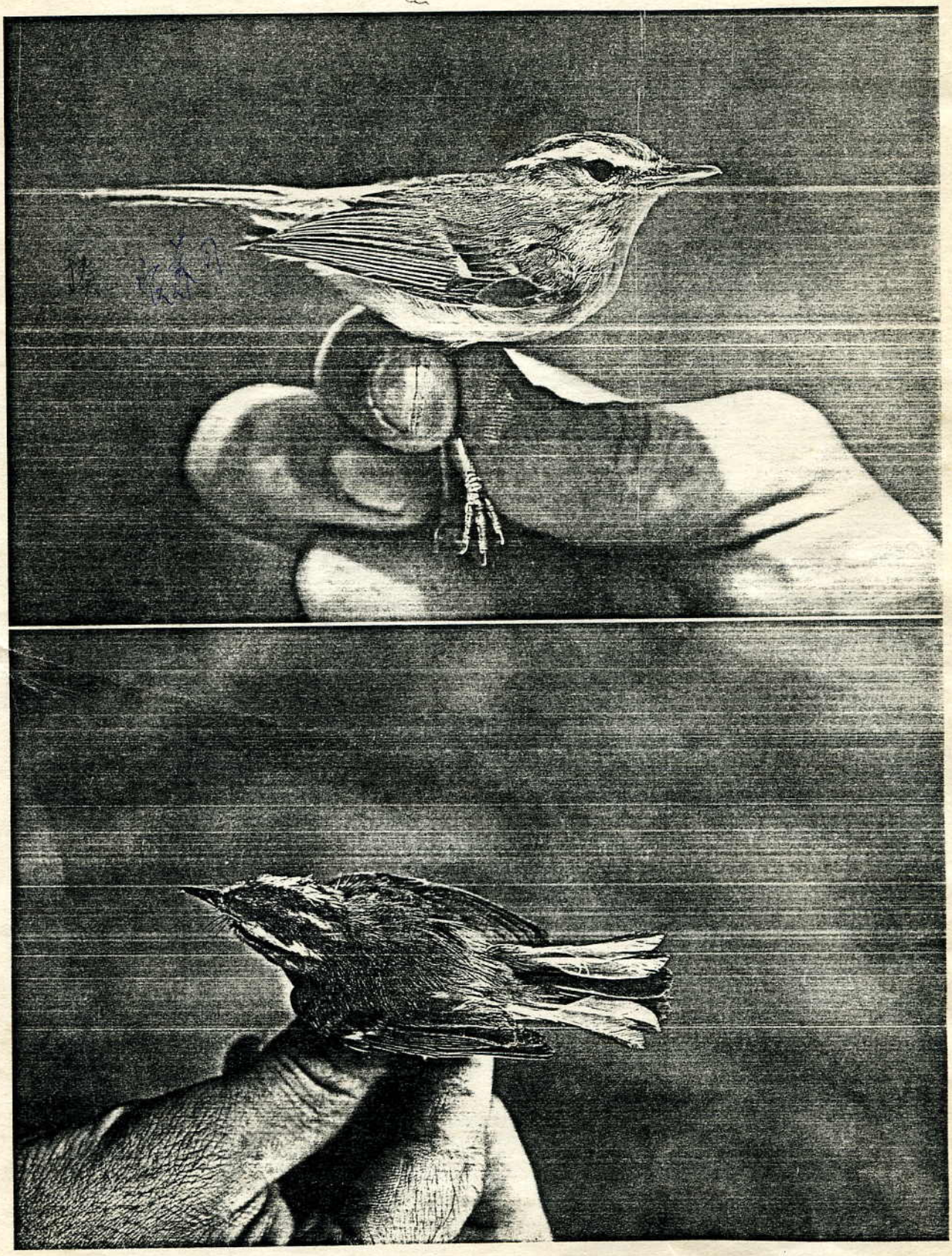

A new species of *Phylloscopus* warbler from Hainan Island, China

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Phylloscopus hainanus is a distinctive new species in the family Sylviidae. The species is endemic to Hainan Island, China, where it is restricted to tropical forest in mountains above 600 m. The most distinctive plumage features are the rather deep yellow underparts and the mainly white outer rectrices.

In 1986 U.O. examined four skins of what were labelled as the Hainan Island subspecies of the Sulphur-breasted Warbler *P. ricketti goodsoni* in the Institute of Zoology, Academia Sinica, Kunming, China (IZASK) (collected at Jian Feng Ling, Ledong County, west Hainan [18°40'N, 108°45'E], and Diao Lou, Lingshui County, south Hainan [18°47'N, 110°05'E]). He was immediately struck by their distinctness from all other species in the genus and considered that this taxon might be a distinct species.

In mid-March 1988 P.A. and U.O. went to Hainan Island in order to investigate the taxonomic status of the form. However, despite thorough surveys of apparently suitable habitat in the vicinity of Qiongzhong in central Hainan, they were unable to find the warbler. Later the same year, P.A. and U.O. found another specimen of the same form in the Institute of Zoology, Academia Sinica, Beijing, China (collected at Daio Lou, south Hainan). Colour photographs of this specimen taken by P.R.C. are lodged in the British Museum (Natural History), Tring, U.K. In April 1988, Stig Jensen (pers. comm.) found the bird to be common at Jian Feng Ling Forest Reserve, Hainan, and obtained a tape recording of its song. P.A. and U.O. noted that the song differed significantly from that of nominate *P. ricketti* of the mainland. In late May 1989, P.A., P.R.C. and U.O. went to Jian Feng Ling Forest Reserve to study the species. Unfortunately, breeding was over, and the birds were moving around singly or in small flocks, singing only sporadically. Nevertheless, the vocal and morphological distinctness of the form was confirmed. In May 1990, P.A. examined the specimens in the Institute of Zoology, Academia Sinica, Kunming, where he confirmed the observations by U.O.

In 1990 one of the two specimens from Hainan Island in the collections of the American Museum of Natural History, New York, which were considered to be *P. ricketti goodsoni*, was loaned to the British Museum (Natural History), Tring. There it was examined by P.R.C., who also took photographs of it, which he sent to P.A. and U.O. To our surprise, it was not the same form as we had been pursuing on Hainan Island, but Blyth's Crowned Willow Warbler *P. reguloides*. Later the same year, P.A. examined the holotype and again the paratype (the specimen which had previously been sent to P.R.C.) of *P. ricketti goodsoni* in the American Museum of Natural History. He concluded that on the basis of plumage, measurements and wing formula they could both be referred to *P. reguloides*. Consequently, *P. ricketti* does not occur on Hainan Island and *P. ricketti goodsoni* is a synonym to *P. reguloides* (Alström, Colston & Olsson, unpubl.).

The specimens in Beijing and Kunming thus belong to an undescribed species, for which we propose the name

***Phylloscopus hainanus*, sp. nov.,**
Hainan Leaf Warbler

HOLOTYPE

Institute of Zoology, Academia Sinica, Beijing no. 52154, male collected at Diao Lou, Lingshui County, south Hainan, Guangdong Province, China (18°47'N, 110°05'E), on 20 April 1962. Collector unknown.

DIAGNOSIS

Medium-sized leaf warbler, with distinctive yellow supercilium, pale median crown-stripe and dark eye-stripe. Plum-

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Plate 1. (above) *Phylloscopus hainanus*, a typical individual. Important characters are the deep yellow underparts and rather faint lateral crown stripes. Jian Feng Ling, west Hainan, 24 April 1992. Photo: Urban Olsson; (below) *Phylloscopus hainanus*, another typical individual. The lateral crown stripes are only slightly darker than the mantle, and the median crown stripe is relatively indistinct pale yellow. The outer tail-feathers are exposed in an unnatural way in this photograph in order to show their distinctive pattern. Jian Feng Ling, west Hainan, 24 April 1992. Photo: Urban Olsson.

age green above and bright yellow below. Pale tips to greater and median coverts form two wing-bars on each wing. The two outer pairs of rectrices are entirely white on the inner webs (Plate 1). There are distinct emarginations on the outer webs of primaries 4–8 (numbered descendantly).

DESCRIPTION OF HOLOTYPE

Lateral crown-stripes vivid green, marginally darker than the mantle, turning somewhat darker toward the rear. Median crown-stripe pale yellow, extending to the bill. Supercilium prominent, extending to base of bill, rather deep, warm yellow throughout its length. Eye-stripe well defined, approximately same colour as lateral crown-stripes. Rest of ear-coverts, throat and remainder of underparts a rather deep, warm yellow, like supercilium. Mantle and scapulars vivid green, rump slightly paler and more yellowish. Greater coverts sepia on inner webs and vivid green (like upperparts) on outer webs, with pale yellowish tips to the six to seven outer coverts, forming a distinct wing-bar. Pale yellowish tips to median coverts also form a wing-bar, although distinctly narrower than the one on the greater coverts. Outer edges of tertials same colour as upperparts, as are outer edges of remiges; edges to outer primaries slightly paler. Outermost two pairs of rectrices (R5, R6) are entirely white on the inner webs. R4 shows a distinct narrow white edge on the inner web. Viewed from below, the inner web of R4 appears clearly paler than the outer web. The underwing-coverts are yellow with some whitish intermixed.

The upper mandible is dark and the lower all pale. The tarsus, toes and claws are medium dark, the soles paler.

Measurements (mm)—Wing 56.0 (maximum length; Svensson 1984), tail 37.0, bill-length (to skull) 12.6, bill-width 2.5 (measured at distal end of nostrils).

Wing formula (primaries [P] numbered descendantly)—Wing-point P7 = P6, P8 −1, P9 −8.5, P5 −1.0, P4 −3.0, P3 −5.0, P2 −8.0, P1 −9.0, P10 −25.5; P10 11.0 > primary coverts; P9 falls between P1 and P2; P4–P8 are emarginated on the outer web.

PARATYPES

There are four specimens of *P. hainanus* in the Institute of Zoology, Academia Sinica, Kunming, China:

(1) male, probably first-year, collected by Professor Yang Lan at Jian Feng Ling, Ledong County, west Hainan (18°40'N, 108°45'E), at an altitude of 820 m on 30 July 1979;

(2) adult female, collected by Professor Yang Lan at the same place on 4 August 1979;

(3) adult male, collected by Professor Yang Lan at Diao Lou, Lingshui County, south Hainan (18°47'N, 110°05'E), at an altitude of 640 m on 26 August 1979 and

(4) adult male collected by Professor Yang Lan at the same place on 27 August 1979.

PARATYPIC VARIATION

There is little variation in plumage among the five known specimens. Measurements (in mm) of the four paratypes are (1) wing 55.0, tail *c.* 40 (difficult to measure), bill-length 12.4, bill-width 2.4; (2) wing 49.5, tail 35.5, bill-length 12.2, bill-width 2.4; (3) wing 52.5, tail 40.5, bill-length 12.2, bill-width 2.4; (4) wing 52.5, tail 41.0, bill-length 12.6, bill-width 2.4.

ETYMOLOGY

We have chosen to name the species after the island where it is endemic. By emphasizing the name of this island, we hope to focus attention on the threats to the vulnerable natural environment there and stimulate conservation measures in order to secure the continued survival of its unique ecosystem. Hainan Island harbours one more endemic bird species, the Hainan Hill Partridge *Arborophila ardens*, and about 60 subspecies of birds that occur nowhere else in China (Cheng 1987), many of them nowhere else in the world. Some of them may deserve full specific status. Most of them are under severe threat of habitat loss.

VOCALIZATIONS

The song is high-pitched and consists of a number of relatively short, varied phrases (Fig. 1), very unlike the rather stereotyped song of *P. ricketti*, but much resembling the song of the White-tailed Leaf Warbler *P. davisoni*. It could be transcribed as *tsitsitsui-tsitsitsui . . . titsu-titsui-titsui . . . titsu-titsui-titsui . . . titsu-titsui-titsui . . . tist tsitsui-tsitsui-tsi . . . pitsu-pitsi-tsu . . . pitsu-pitsi-tsu.*

The calls could be transcribed as *pitsitsui*, *pitsiu* or *pitsi-pitsu*, or similar (Fig. 2). They are very close to those of *P. davisoni*.

DISTRIBUTION

As far as we are aware, the species has only been collected at two localities in Hainan: Diao Lou, south Hainan, and Jian Feng Ling, west Hainan (Fig. 3). One individual was seen at Bawanling on 22 April 1988 by Ben King (pers. comm.). It seems to be absent from suitable forest near Qiongzhong, south central Hainan. Much of the hill forest in Hainan has been cleared, but the species may occur in isolated pockets where suitable habitat still exists. In Jian Feng Ling, it is rather common, and its existence in this area does not seem to be under any major threat at present because at least part of the area is protected from logging.

At Jian Feng Ling, it occurs mainly in secondary growth at the forest edges, e.g. along the road just outside the reserve (Fig. 4), where it appeared to be one of the most

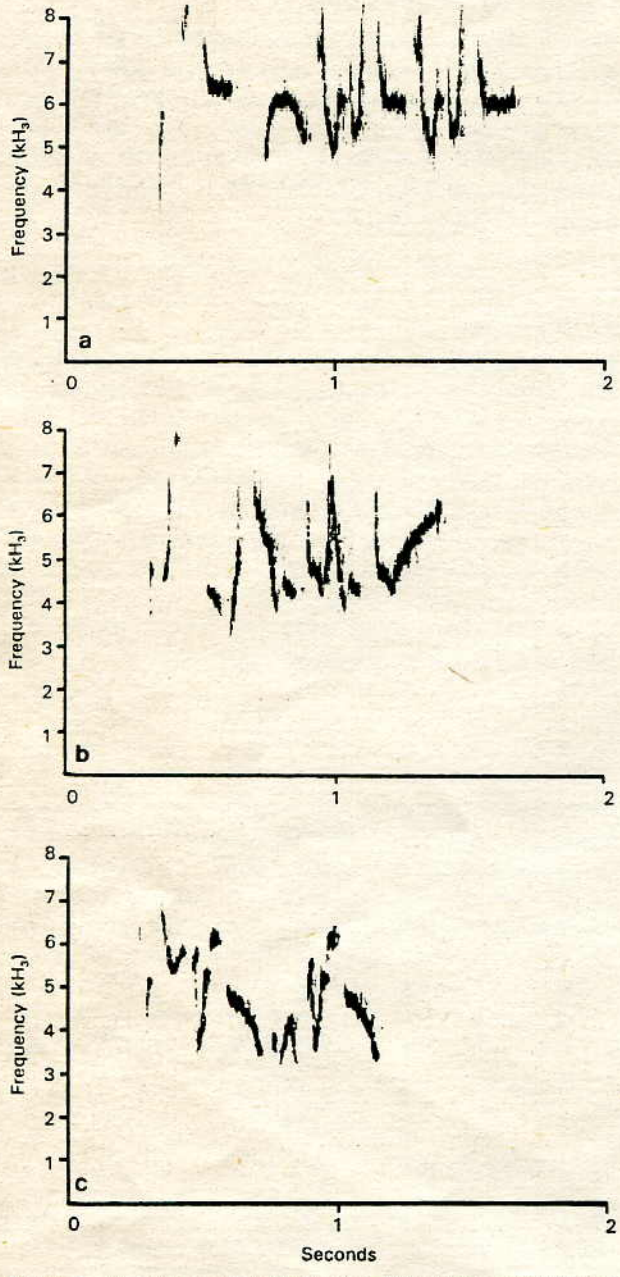

Figure 1. (a–c) Sonagrams illustrating different song strophes of *Phylloscopus hainanus*. Recordings by Per Alström, Hainan Island, China, April 1992; sonagrams made by Richard Ranft, British Library of Wildlife sounds. Band width 369 Hz.

common bird species on a visit by P.A. and U.O. in late April 1992. Very few individuals were observed inside the mature tropical forest.

It is not known whether or not the species is migratory. We are not aware of any records between September and March, but this may be due to there being few visits by ornithologists at this time.

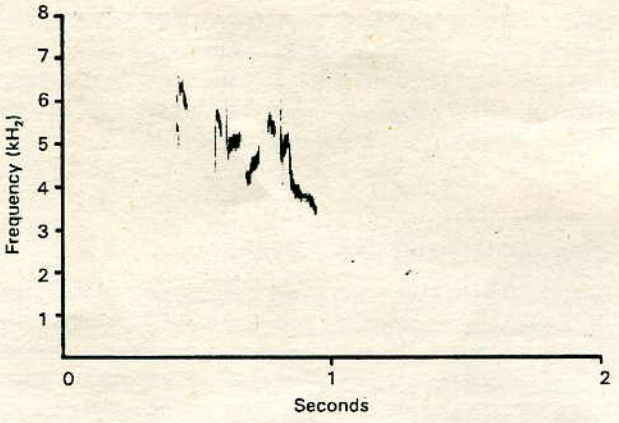

Figure 2. Sonagram illustrating one type of call of *Phylloscopus hainanus*. Recording by Per Alström, Hainan Island, China, April 1992; sonagrams made by Richard Ranft, British Library of Wildlife sounds. Band width 369 Hz.

BREEDING

In late April 1992 at Jian Feng Ling, P.A. and U.O. observed several pairs with fledged young and found one nest with nearly full-grown young. The nest was situated on the face of a steep bank by a road, some 170 cm above the road. It was dome-shaped, with a side entrance, and was built of slender panicles, in combination with broad grass leaves and a few thin roots and degraded remains of leaves. It was lined with dense pappus fibres, thin bast from tree-ferns and some pale brown and yellow feathers.

In late May 1989, the birds did not seem to be territorial but moved around in feeding flocks with other species.

RELATIONSHIPS AND RECOGNITION

Phylloscopus hainanus is identifiable as belonging to the genus *Phylloscopus*, as opposed to *Seicercus*, by the relatively narrow-based bill, the rather thin and inconspicuous, although quite long, rictal bristles and typical *Phylloscopus* head pattern.

We have examined a number of specimens of most forms of Asiatic *Phylloscopus* species and studied several in the field (see Appendix). On morphological grounds, *P. hainanus* appears to be most closely related to *P. davisoni*. Size, proportions, general plumage pattern and wing formula are similar. However, all subspecies of *P. davisoni* are much paler yellow below and show distinctly darker lateral crown-stripes (at least posteriorly) and considerably less white on the penultimate tail-feather. The Sulphur-breasted Warbler *Phylloscopus ricketti* and the Mountain Leaf Warblers *P. trivirgatus trivirgatus* and *P. t. parvirostris* share the general plumage patterns, including rather bright yellow colouration of the underparts, but show much darker lateral crown-stripes and lack white outer rectrices. The latter two further differ in lacking distinct wing-bars and in showing much dark on the lower mandible.

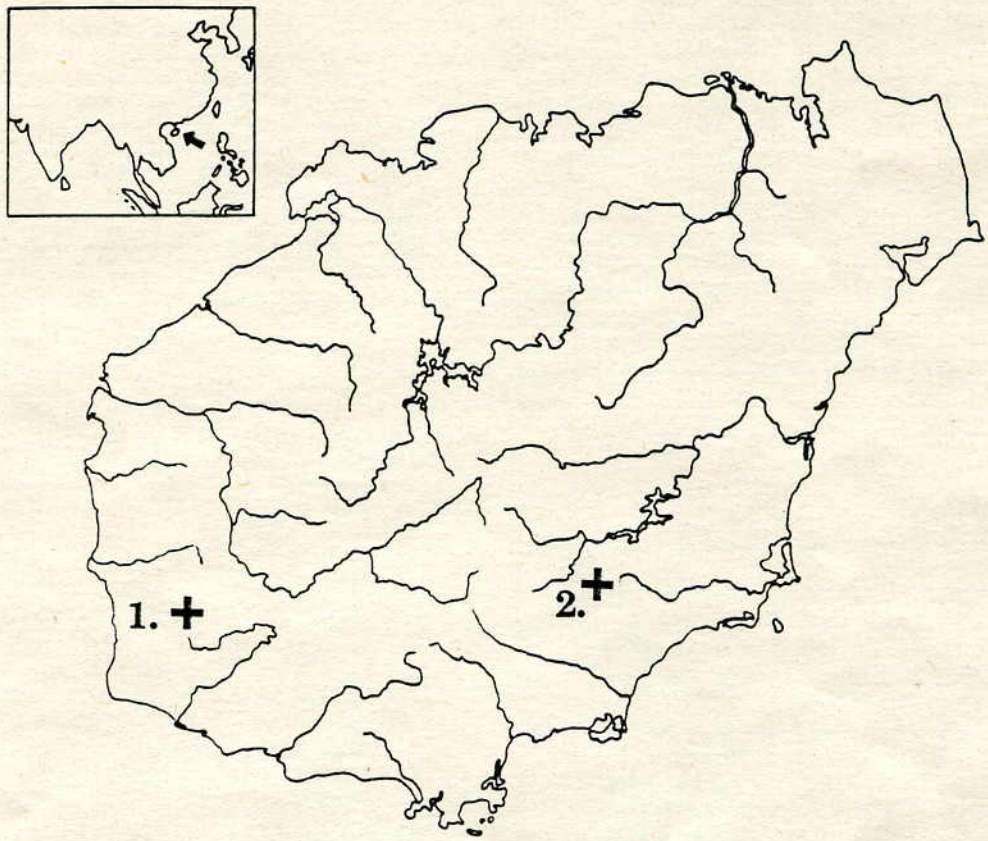

Figure 3. Hainan Island. The two localities where specimens of *Phylloscopus hainanus* have been obtained are (1) Jian Feng Ling Forest Reserve and (2) Diao Lou Mountain.

The Timor Leaf Warbler *P. presbytes floris*, the Mountain Leaf Warblers *P. trivirgatus malindangensis*, *P. t. flavostriatus* and *P. t. mindanensis* and the Sulawesi Leaf Warbler *P. sarasinorum sarasinorum* show roughly the same amount of white in the tail and some yellow below. However, they all differ from *P. hainanus* in being less brightly coloured, especially below, in showing less distinct or no wing-bars and in usually showing much dark on the lower mandible.

Vocally, *P. hainanus* is most reminiscent of *P. davisoni*. This is a further indication of the close relationship with this species.

Figure 4. Typical habitat of *Phylloscopus hainanus*. Most singing males were in secondary forest or scrub at the edge of mature forest. At least one male was holding a territory in the area shown in this picture. Jian Feng Ling, west Hainan, 24 April 1992. Photo: Urban Olsson.

MOULT

One of the males in IZASK, collected 26 August 1979 at Diao Luo, had just finished moult of flight feathers (traces of feather sheaths). Another, collected 27 August 1979 at the same locality, was in the final stages of a complete moult. A female from Jian Feng Ling, collected 4 August 1979, had just finished moult, with the exception of secondary 6, which was still growing. A probable first year male from Jian Feng Ling, collected 30 July 1979, showed no sign of moult. This suggests that adult birds go through a complete moult in July–August.

We are indebted to Professors Yang Lan and Cheng Baolai at the Institute of Zoology, Academia Sinica, Kunming, for their kind assistance. Professor Yang Lan provided photographs of specimens.

In Beijing, Professors Cheng Tso-hsin, Tan Yao-kuang and Lu Tai-chun provided invaluable assistance, as did Kiyoaki Ozaki and Yoshimitsu Shigeta at the Yamashina Institute for Ornithology, Japan. We are indebted to Stig Jensen, who supplied information about distribution and lent us tape recordings. We are also grateful to Richard A. Sloss and Mary LeCroy, at the American Museum (Natural History), New York, for sending us specimens and granting access to the collections, respectively. Dr G. F. Mees, Leiden, Kees Rooselaar, Amsterdam, and Dr Jon Fjeldså, Copenhagen, were all helpful in various aspects of our research. The sonagrams were prepared by Richard Ranft at the British Library of Wildlife Sounds, London. We are also grateful to Dr Alan Knox and Ben King for comments on an earlier draft of this manuscript. The inclusion of a colour plate was made possible, in part, by a grant from Kungliga Patriotiska Sällskapet.

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APPENDIX: SPECIMENS EXAMINED

We have examined the following relevant forms mentioned by Hartert (1910), Ticehurst (1938), Williamson (1967), Watson et al. *(1986) and Sibley & Monroe (1990) in the American Museum of Natural History, New York, USA; British Museum (Natural History), Tring, UK; Institute of Zoology, Academia Sinica, Beijing, China; Institute of Zoology, Academia Sinica, Kunming, China; Yamashina Institute of Ornithology, Chiba, Japan; Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands, and Zoological Museum, University of Copenhagen, Denmark. We have not been able to examine every subspecies of the island forms. None of the taxa below, however, appeared to be closely related to* Phylloscopus hainanus.

Species	Number of specimens studied	Number of field observations
Phylloscopus hainanus	5	50+
P. reguloides reguloides	50+	100+
P. r. kashmiriensis	10+	—
P. r. assamensis	60+	100+
P. r. claudiae	20	100+
P. r. fokiensis	40	10+
P. r. ticehursti	8	20+
P. davisoni davisoni	70+	100+
P. d. disturbans	10	30+
P. d. ogilvie-granti	6	—
P. d. klossi	14	50+
P. ricketti ricketti	40+	100+
P. r. goodsoni[1]	3	—
P. trivirgatus trivirgatus	60+	10+
P. t. mindanensis	1	—
P. t. malindangensis	6	—
P. t. peterseni	2	—
P. t. flavostriatus	1	—
P. t. parvirostris	23	10+
P. t. kinabaluensis	14	—
P. t. nigrorum	35	10+
P. cebuensis cebuensis	23	—
P. c. luzonensis	12	10+
P. olivaceus	38	1
P. poliocephalus poliocephalus	9	—
P. p. matthiae	2	—
P. p. henrietta	7	—
P. p. albigularis	6	—
P. p. cyclopum	3	—
P. p. hamlini	4	—
P. p. moorhousei	14	—
P. p. maforensis	7	—
P. p. bougainvillei	24	—
P. p. pallescens	1	—
P. p. becki	20	—
P. p. ceramensis	10	—
P. p. everetti	15	—
P. p. waterstradti	33	—
P. p. giulianettii	54	10+
P. sarasinorum sarasinorum	28	—
P. s. nesophilus	45	—
P. presbytes presbytes	14	—
P. p. floris	12	—
P. makirensis	16	—
P. amoenus	5	—
P. ijimae	10+	50+
P. coronatus	120	50+

[1] This form is, in our opinion, not a subspecies of *P. ricketti* but belongs with *P. reguloides* (Alström, Colston & Olsson, unpubl.).