

## Relationships of the Ogasawara Islands Grosbeak *Chaunoproctus ferreorostris* (Aves, Fringillidae)

By

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**Abstract** The relationships of the Ogasawara Islands Grosbeak *Chaunoproctus ferreorostris*, an extinct heavy-billed finch endemic to the Ogasawara (Bonin) Islands, are discussed. The available evidence indicates that the bird is related to *Carpodacus*, and in particular to *C. erythrinus* widespread in the Palearctic region.

The Ogasawara Islands Grosbeak *Chaunoproctus ferreorostris* is one of the heaviest-billed finches of the world. It is a monotypic genus and species endemic to the Ogasawara (Bonin) Islands, that became extinct during the early period of exploration of the islands in the middle 1800's. A concise account of its history was given by GREENWAY (1958). A dozen specimens were collected by Captain BEECHEY and F. H. von KITTLITZ and preserved in museums in Tring, Paris, Leyden, Frankfurt, Berlin, Leningrad, and New York (GREENWAY's citation of specimens in Tokyo is an error). Skeletal and spirit specimens were not preserved. I have seen the skins in Tring, Leningrad and New York.

The relationships of this remarkable bird have been commented upon by several authors. SEEBOHM (1890) considered it to be related to the Pine Grosbeak *Pinicola enucleator*, although he also considered *Telespiza* (= *Loxioides*) *cantans* and *Psittirostra psittacea*, which are now placed in the Drepanididae (Hawaiian honeycreepers), as the closest allies of *Chaunoproctus*. SUSHKIN (1924) was of the opinion that *Chaunoproctus* belongs to the "Cardinalinae" comprising purely American genera such as *Richmondia*, *Cyanocompsa* and *Oryzoborus*. Neither SEEBOHM nor SUSHKIN gave sufficient reasons for their statements. HACHISUKA (1930), on the other hand, argued that the Juniper Finch *Propyrrhula subhimachala* of the Himalayas and western China is the closest relative of *Chaunoproctus*. Hachisuka's view has been accepted, at least, by almost all Japanese ornithologists at present. PAYNTER (1968) wrote, however: "Affinities [of *Chaunoproctus*] unknown but on zoogeographical grounds one may guess at a relationship with widespread *Carpodacus*".

I have had the opportunity of studying *Propyrrhula* both in the field and in the museum and feel that PAYNTER is likely to be correct in thinking that *Chaunoproctus* is related to *Carpodacus* and in merging *Propyrrhula* with *Pinicola*. I would even go so far as to state that *Chaunoproctus* is most closely related to the Scarlet Finch *Carpodacus erythrinus* of the Palearctic region, the former being a giant insular re-

presentative of the latter.

### Relationship with *Carpodacus*

My reasons for considering that *Chaunoproctus* is to be related to *Carpodacus* are as follows.

*Female plumage.* The females of *Pinicola* and *Propyrrhula* are grey, with the head, upperparts, breast and sides variously suffused with golden or olive yellow, the yellow being brighter on the forehead and breast. The upperparts of the female of *Propyrrhula* are greenish olive rather than yellowish, but the forehead and breast are golden yellow. The females of *Carpodacus* are greyish or brownish, and in most species there is no yellow in their plumage. Although a few species have females with some yellow on the body (e. g. *C. fasciatus*, *thura*), they nevertheless lack yellow on the head and are thus distinct from the females of *Pinicola* and *Propyrrhula*. The female of *Chaunoproctus* is entirely brownish, with the underparts lighter than the upperparts, and it has no yellow in the plumage. HACHISUKA (1930) stated that in *Chaunoproctus* there was a small yellow spot at the base of the bill, just as in *Propyrrhula*; I think this yellowish spot on *Chaunoproctus* is due to fading of the brown color (HACHISUKA and I examined the same specimen in Tring).

*Bill shape.* Both in *Pinicola* and *Propyrrhula* the bill is short, broad and thick, with the culmen markedly convex from the base, and the tip of the upper mandible hooked. Although *Pinicola* and *Propyrrhula* are similar in bill shape (they have a thick, hooked bill), the upper mandible of *Propyrrhula* is peculiar in that it is considerably flat and thin, with the culmen weakly ridged, whereas the ramus of the lower mandible is proportionately very deep. In *Pinicola* the upper mandible is much thicker and the ridge of the culmen more distinctly marked. In these respects the bill of *Propyrrhula* resembles closely that of bullfinches *Pyrrhula*, though the adaptive significance of this specialization is not apparent.

Species of *Carpodacus*, as a rule, have a straighter culmen, producing a short conical bill, although the curvature of the culmen varies somewhat among the species (but unlike *Pinicola* and *Propyrrhula* its tip is not distinctly hooked). *Chaunoproctus* has a thick, conical bill with a slightly curved culmen, as is typical of the *Carpodacus* bill. HACHISUKA (1930) said that except for its massive size the bill of *Chaunoproctus* is exactly like that of *Propyrrhula*. I cannot agree with his statement.

*Foraging behavior.* Since *Chaunoproctus* became extinct soon after the first specimens were taken, very little is known of its habits and behavior. For instance, we know nothing about its nest, eggs, nestling, and breeding behavior. Fortunately, however, KITTLITZ, one of the two men who saw the species in the field, has left excellent notes on its foraging behavior: "The bird lives on Bonin-sima, alone or in pairs, in the forest near the coast. It is not common but likes to hide, although of a phlegmatic nature and not shy. Usually it is seen running on the ground, only seldom high in the trees. Its call is a single soft, very pure, high piping note, given sometimes

shorter, sometimes longer, sometimes singly or sometimes repeated. In its muscular crop and spacious gullet I found only small fruits and buds" (quoted from GREENWAY, 1958; HACHISUKA and other Japanese authors used the same statement in somewhat different phrases and connotations in their Japanese translation).

The behavior of *Chaunoproctus* cited above reminds me strongly of that of certain *Carpodacus* species. I had ample opportunities to observe *C. nipalensis*, *rhodochrous*, *pulcherrimus* and *erythrinus* in Nepal, Sikkim and northern Thailand in the non-breeding season and *C. vinaceus* in Taiwan in the breeding season, in addition to several other species (*C. thura*, *rhodopeplus*, *rubicilla*, *roseus*) at other times and places. The *Carpodacus* species that I observed, *C. nipalensis*, *thura*, *erythrinus* and *vinaceus* in particular, frequented open places with more or less exposed ground and interspersed light scrub on the outskirts of forests. They were frequently found hopping and feeding on bare ground, and sometimes on rocks, singly, in pairs, or in small flocks. Though not based on quantitative data, presumably 80% of their feeding was done on the ground (non-breeding season, but *C. vinaceus* in the breeding season). *C. rhodochrous*, *pulcherrimus* and *roseus*, on the other hand, seemed to be more arboreal than terrestrial in habits, favoring light woods, sparse scrub and roadside bushes and feeding, by rough estimate, only 20–40% on the ground (*C. roseus*, the most arboreal species among the *Carpodacus* species I mentioned, would feed chiefly in bushes). Nevertheless they avoided dense bushes and other impenetrable vegetation, thick forests, and tall trees. *Carpodacus*, however, would hide in the dense undergrowth when they seek refuge from predator and/or roost at night since I caught them with mistnets placed inside the forest.

*Pinicola enucleator* in Japan inhabits chiefly the dense bushes of dwarf pines *Pinus pumila* above tree line in the mountains of Hokkaido in summer, although in North America it occurs in varied habitats from the seacoast to the boreal zone on high mountains (BENT *et al.*, 1968). The bird (in Hokkaido) is usually found singing and feeding in the top of thickets and feed much less frequently on the ground. In winter it moves to coniferous forests at lower elevations and occasionally visits suburban areas, chiefly feeding in trees. *Pinicola* is obviously more arboreal than most *Carpodacus* species, whereas *Chaunoproctus*, as observed by KITTLITZ, seems to be very different from *Pinicola* in its habits.

*Propyrrhula subhimachala* is an uncommon bird of high elevations, ranging from about 3,500 to 4,200 m in summer and down to about 1,800 m in winter (ALI & RIPLEY, 1974), in Nepal and Sikkim, and I encountered it on a few occasions in the fall. The birds that I watched were perching singly on the thick and low growth of stunted pines and rhododendrons and remained quite inactive. The typical habitat of this species appears to be dense, low scrub which completely covers the ground. Although I did not observe *Propyrrhula* feeding, the nature of its habitat is such that ground feeding would probably be very unusual for this species. While little information on its foraging behavior is available from the literature, BAKER (1926) has the following account: "It kept much to stunted oak, rhododendron and scrub-jungle, haunting

the bushes at about 5 to 15 feet from the ground and never, as far as could be seen, visited either the higher trees or the ground". Other observers were also impressed by close similarity of behavior and habitat between *Pinicola* and *Propyrrhula* (e. g. DIESSELHORST, 1968).

### Discussion

There is no doubt in my mind that the closest relative of *Propyrrhula* is *Pinicola*. The resemblance of bill structure in *Propyrrhula* and *Pyrrhula* would be a convergence since the two genera are otherwise rather different. *Pyrrhula* is, however, somewhat distantly related to both *Pinicola* and *Propyrrhula*.

As to the relationships between *Chaunoproctus* and *Carpodacus*, the five larger species of *Carpodacus* are rather distinct from *Chaunoproctus*: *C. rubicilla*, *rubicilloides* and *puniceus* in having white-spotted males (white spots in *puniceus* on the throat and breast only) and heavily streaked females; *roborowskii* in having different proportions with much longer wings and a slender and pointed bill; *trifasciatus* in having a different male head pattern and much white in the wing. The peculiar *C. roborowskii*, sometimes placed in its own genus *Kozlowia*, may be related to the *rubicilla* group.

Among the smaller species the three North American ones (*C. purpureus*, *casinii*, *mexicanus*) can be eliminated from the list of potential close relatives of *Chaunoproctus* on zoogeographical grounds. The Palearctic species are, with the exception of *C. erythrinus*, also distinct from *Chaunoproctus* in certain respects (e. g. different male plumage pattern, distinctly streaked females, etc.). By a process of elimination, *C. erythrinus* is the only *Carpodacus* species remaining as a possible closest relative of *Chaunoproctus*. I think the resemblance between the two is very high: red on the males is more or less confined to the head, upperparts and breast; the abdomen is whitish; faint streaks occur on the male's back and on the female's upper- and undersides; an inconspicuous eyebrow is present; and so forth. Bill shape is very much the same except for size. Both are more terrestrial in habits (*C. erythrinus* at least in the non-breeding season) and both feed frequently on the ground.

It can hardly be denied that such resemblances may well be due to a convergence or parallelism. Bill shape, for instance, can be modified easily by feeding adaptations. But at the same time many families, subfamilies and genera are defined by bill shape. Unless one wants to be an agnostic, the close similarity between *Chaunoproctus* and *C. erythrinus* could be accepted as indicating a probable relationship, in the absence of the evidence that *Chaunoproctus* is more closely related to a species other than *C. erythrinus*. The latter is the most widespread and most geographically variable species of the genus, and both gigantism and dwarfism occur on islands.

Taxonomically *Chaunoproctus* may be retained as a monotypic genus until its relationship with a particular species of *Carpodacus* is better established.

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### Literature Cited

- ALI, S., & S. D. RIPLEY, 1974. Handbook of the Birds of India and Pakistan. 10. xx+334 pp. Bombay, Oxford University Press.
- BAKER, E. C. S., 1926. The Fauna of British India including Ceylon and Burma. Birds (2nd ed.). 3. xx+489 pp. London, Taylor & Francis.
- BENT, A. C., *et al.*, 1968. Life histories of North American cardinals, grosbeaks, buntings, towhees, finches, sparrows, and allies. Part I. *U. S. nat. Mus. Bull.*, (237): 1-602.
- DIESSELHORST, G., 1968. Beiträge zur Ökologie der Vögel Zentral- und Ost-Nepals. *Khumbu Himal*, 2: 1-417.
- GREENWAY, J. C., 1958. Extinct and Vanishing Birds of the World. x+518 pp. New York, American Committee for International Wild Life Protection.
- HACHISUKA, M., 1930. Relationships of *Chaunoproctus ferreostris*. *Tori*, 6: 268-269. (In Japanese.)
- PAYNTER, R. A., 1968. Subfamily Carduelinae. In Check-list of Birds of the World, 14: 207-306. Cambridge, Museum of Comparative Zoology.
- SEEBOHM, H., 1890. The Birds of the Japanese Empire. xxiv+386 pp. London, R. Porter.
- SUSHUIN, P., 1924. [On the Fringillidae and allied groups.] *Bull. Brit. orn. Club*, 45: 36-39.

