G. auceps as follows: humerus with ventral tubercle in ventral view partly obscuring the pneumatic foramen (Fig. 24A); brachial depression of humerus not extending as far proximally; carina of sternum higher with anterior margin set back markedly from the manubrium (Fig. 25A, C), dorsal intercoracoidal notch wide and deep; rostrum not as deep.

Remarks: In the series of tarsometatarsi of this species there is variation that suggests sexual dimorphism in size (Fig. 28A–D). This is not evident in any of the available elements of *G. orion*; the material of *G. auceps* and *G. erdmani* is insufficient to assess intraspecific size variation.

Grallistrix erdmani, new species
(Figs. 26D, 27D, 29A, C, E)

"long-legged owl" Olson and James, 1984:77; James et al., 1987:2353.

Holotype: Nearly complete associated skeleton, USNM 426129. Collected 2 April 1986 by Storrs L. Olson, Helen F. James, R. Michael Severns, Avis C. James, Travis A. Olson, and Sydney B. Olson. The specimen consists of: right half of rostrum and fragments of cranium; various sclerotic plates, left quadrate, mandible lacking a portion of the postdentary ramus on each side, incomplete sternum, incomplete furcula, right scapula, right and left coracoids, incomplete pelvis, left humerus, proximal and distal portions of right humerus, right and left radii, ulnae, carpometacarpi, femora (Fig. 29A), tibiotarsi (Fig. 29C), fibulae, and tarsometatarsi (Fig. 29E), alar phalanx 1 digit II and a smaller alar phalanx, one radiale and one ulnare, one first metatarsal, 21 pedal phalanges, 19 presacral and 2 caudal vertebrae, various ribs, and ossified laryngeal cartilages. The preservation is variable, the bones having been exposed on bare lava and rendered rather friable, so that some are considerably eroded.

Type locality: Owl Cave near Puu Makua (1,402 m), Maui, Hawaiian Islands.

Distribution: Maui: lava tubes on the southern slope of Mt. Haleakala.

Etymology: To Pardee Erdman, owner of Ulupalakua Ranch, without whose active interest and cooperation we would know practically nothing about the former avifauna of Maui.

Measurements (mm) of holotype: (Measurements of paratype USNM 435165 are given in parentheses except for the pedal phalanges, which were omitted.)—Premaxillary symphysis: approximate length from anterior margin of nasal fossa, 10+ mm (11.8). Quadrate: dorsoventral depth, 12.0 (13.5). Mandible: length and posterior width of symphysis, 7.0 × 8.3 (ca. 6 × 7.9); width of articulation through internal process, 11.5 (—). Sternum: length along midline, ca. 33 (—); depth through apex of carina, 13.5+ (—). Coracoid: greatest length, 33.0 (31.6). Scapula: length, ca. 40 (—). Sacrum: length along midline, 34.2 (37.5). Humerus: length, 70.7 (70.2); shaft width at midpoint, 4.8 (4.6); distal width, 11.7 (12.4). Ulna: length, 76.1 (76.6); proximal depth, 8.1 (8.1); shaft width at midpoint, 3.2 (3.2); distal width, 6.1 (5.7). Radius: length, 72.0 (72.6). Carpometacarpus: length, 35.6 (37.3); proximal depth, 8.8 (8.8). Alar phalanx 1 digit II: length, 16.4 (17.4). Femur: length, 54.5 (55.0); proximal width, 9.2 (9.7); shaft width at midpoint, 4.2 (4.4); distal width, 10.3 (11.1). Tibiotarsus: length, 96.7 (98.2); proximal width, 8.6 (9.3); shaft width at midpoint, 4.5 (4.7); distal width, 9.4 (9.6). Tarsometatarsus: length, 68.6 (70.1); proximal width, 10.3 (10.4); shaft width at midpoint,

4.0 (4.2); distal width, 10.1 (10.5). Pedal phalanges (greatest length): Digit I—p1, 11.6; p2, ca. 10. Digit II—p1, 9.7; p2, 17.2; p3, ca.14. Digit III—p1, 7.2; p2, 11.3; p3, 14.2; p4, 15.0. Digit IV—p1, 4.4; p2, —; p3, 4.6; p4, 10.9; p5, 11.1.

Paratypes; Length measurements (mm) follow in parentheses. Right coracoid, USNM 399421 (34.1); left coracoid, USNM 399041 (34.6); right humerus, USNM 384403 (73.0) (Fig. 26D); left carpometacarpus, USNM 397870 (37.4); right tibiotarsus, USNM 399348 (99.1) (Fig. 27D); associated skeleton, USNM 435165 (for measurements, see above).

Measurements of paratypes: See above.

Diagnosis: Much smaller than *Grallistrix auceps* or *G. geleches* (Table 4). Most similar to *G. orion* but limb elements more gracile; proportions of hindlimb differ in that the femur in *G. erdmani* is shorter, whereas the tarsometatarsus is longer and more slender than in *G. orion* (Fig. 29). The shaft of the humerus is more slender and curved (Fig. 26).

Remarks: The comparisons between this small species and *G. orion* suffer from the lack of associated material from Oahu. Nevertheless, the two associated skeletons of *G. erdmani* from Maui show that the hindlimb proportions of that species are quite distinct from those of the Oahu bird. The femora are shorter than any of those from Oahu, whereas the tarsometatarsi are longer. Furthermore, the small species from Maui is separated geographically from the small Oahu bird by the much larger species *G. geleches* of Molokai.

It is curious that the four known species of *Grallistrix* alternate in size from island to island, the progression from Kaui, to Oahu, to Molokai, to Maui, being large, small, large, small. That Molokai and Maui should each have a different species is particularly strange considering that these islands were at times connected during the Pleistocene. It is conceivable that these two owls were sympatric, with the larger *G. geleches* in the lowlands of both islands and the smaller *G. erdmani* at higher elevations, but the material from as low as 305 m on Maui at Puu Naio is referable to *G. erdmani.* Furthermore, *G. orion,* which occupied the lowlands on Oahu, is a small species. It would be most interesting to know the nature of the species that may have occurred on Hawaii, but so far we have no trace of *Grallistrix* from that island.

DISCUSSION

The known geographical distribution of endemic species of non-passerine birds in the Hawaiian Archipelago is summarized in Table 5. The many gaps evident here are in most cases indicative of the inadequacies of the fossil record. There is no reason, for example, why all four genera of raptors should not have occurred on all the main islands. The gaps are even more striking when it is recalled that no resident endemic land birds of any sort were ever recorded from Kahoolawe or Niihau, each of which must have harbored representives of most of the groups that colonized the rest of the archipelago. Unfortunately, we have as yet no fossil record from either island to substantiate this supposition.

Although dividing an avifauna into passerines and non-passerines is an arbitrary convenience (and an artificial one in the sense that "non-passerines" do not constitute a taxon), the evolutionary and post-human histories of these two categories in the Hawaiian Islands differ considerably, so that there is a certain logic in making this division. The fossil record shows that although endemic species