

TABLE 4

COMPARISON OF LENGTH MEASUREMENTS (MM) OF SELECTED ELEMENTS OF *Grallistrix*, BASED ON HOLOTYPE AND PARATYPE SPECIMENS ONLY. FOR EACH MEASUREMENT THE FIGURES GIVEN ARE THE MEAN, RANGE, AND NUMBER OF SPECIMENS WHEN GREATER THAN 1

	<i>G. auceps</i> (Kauai)	<i>G. orion</i> (Oahu)	<i>G. geleches</i> (Molokai)	<i>G. erdmani</i> (Maui)
Coracoid	—	33.5 33.4–33.8 n = 3	39.8	33.3 31.6–34.6 n = 4
Humerus	80.7	71.5 68.1–74.6 n = 4	80.2	71.3 70.2–73.0 n = 3
Ulna	83.3*	78.8 76.0–81.7 n = 3	85.5 84.4–87.0 n = 3	76.3 76.1–76.6 n = 2
Carpometacarpus	43.1	37.8 36.3–39.7 n = 4	41.0 40.8–41.3 n = 2	36.8 35.6–37.4 n = 3
Femur	66.7	57.0 56.3–57.8 n = 6	64.1 62.5–65.0 n = 4	54.7 54.5–55.0 n = 2
Tibiotarsus	109.8 109.1–110.6 n = 2	100.5 97.0–104.4 n = 8	116	98.0 96.7–99.1 n = 3
Tarsometatarsus	—	65.7 64.4–66.9 n = 4	80.5 76.4–85.0 n = 4	69.3 68.6–70.1 n = 2

* Measurement is of a radius; no ulna was available.

29B), USNM 435155 (56.7), USNM 143156 (57.8); right tibiotarsi, USNM 435157 (102.2), USNM 435158 (98.9), USNM 435159 (98.2), USNM 435161 (102.6); left tibiotarsi, USNM 386123 (ca. 97), USNM 386175 (104.4) (Figs. 27C, 29D), USNM 435160 (98.0), USNM 435162 (102.4); right tarsometatarsi, BBM-X 155106 (66.0) (Fig. 28F), USNM 435163 (66.9); left tarsometatarsi, USNM 386225 (64.4) (Fig. 28G), BBM-X 155105 (65.5) (Fig. 28H).

Measurements of paratypes: See above.

Diagnosis: Decidedly smaller than *Grallistrix auceps* or *G. geleches* (Table 4). Similar in size to *G. erdmani* but limb elements more robust; tarsometatarsus shorter whereas the femur is longer than in *G. erdmani*. In the characters that distinguish *G. auceps* from *G. geleches*, *G. orion* is more similar to the latter. The carina in the one available sternum of *G. orion* is more reduced than in either of those two species.

Remarks: See *G. erdmani*.

***Grallistrix geleches*, new species**

(Figs. 20A–C, 21A–D, 22A–C, 23A, 24A, 25A, C, 26B, 27B, 28A–D)

“long-legged Molokai owl” Olson and James, 1982b:37, 44; 1984:772.

Holotype: Associated partial skeleton, USNM 386140. Collected 9 and 12 July 1976 by Storrs L. Olson and Joan Aidem. The specimen consists of a nearly complete skull (Fig. 20A–C), partial sclerotic rings, right pterygoid, right and left

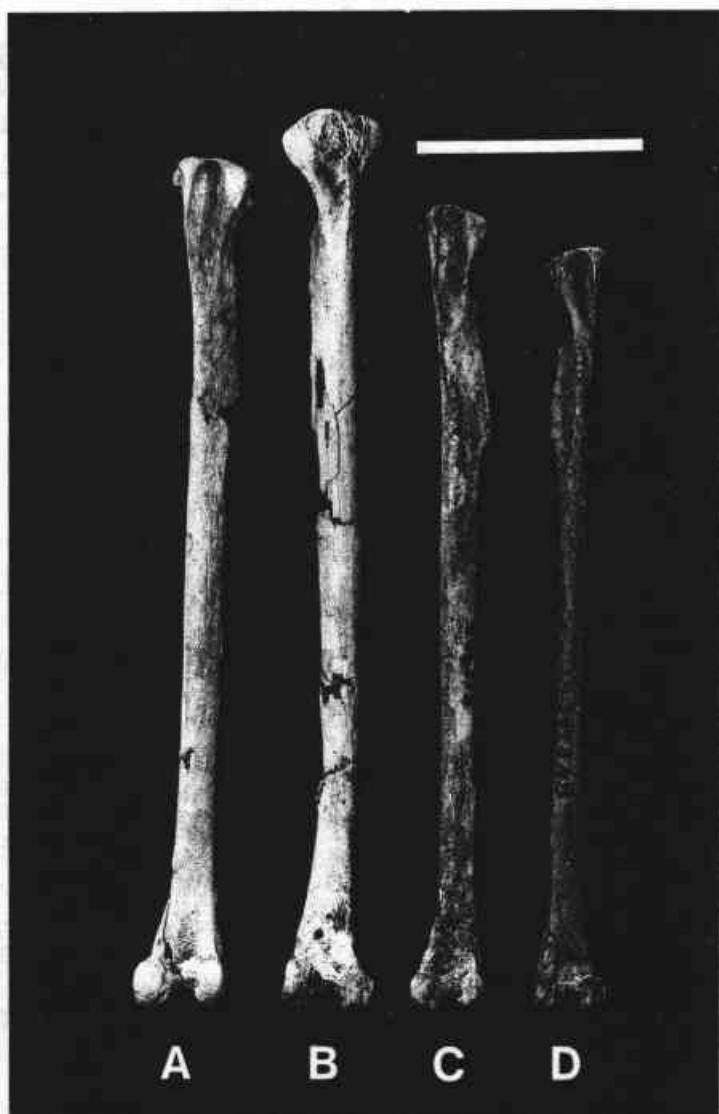


FIG. 27. Tibiotarsi of *Grallistrix*, new genus, in anterior view: (A) *G. auceps*, new species, holotype BBM-X 150202; (B) *G. geleches*, new species, BBM-X 147928; (C) *G. orion*, new species, USNM 386175; (D) *G. erdmani*, new species, USNM 399348. Scale = 3 cm.

quadrates, mandible, sternum (Fig. 25A, C), furcula, right and left scapulae, left humerus (Figs. 21A, 24A, 26B), right and left femora (Fig. 22A), fibulae, tarsometatarsi (Figs. 22C, 28A), and first metatarsals, all pedal phalanges except one p1 dI and the left p2 dII (Fig. 23A), eight vertebrae, and various ribs and ossified tendons. The bones were collected both at the surface and at depths up to 40 cm or more in loose sand over an area at least 2 m in diameter, but certainly represent a single individual (see Olson and James 1982b:19). The preservation is excellent, the bones being unweathered, so burial must have been rapid.

Type locality: Vicinity of sites 5 and 10, Moomomi dunes, Molokai, Hawaiian Islands.



FIG. 28. Tarsometatarsi of *Grallistrix geleches*, new genus and species (A–D) and *G. orion*, new genus and species (E–H) in anterior view showing possible sexual size variation in the former: (A) holotype USNM 386140; (B) BBM-X 146685; (C) BBM-X 146815; (D) BBM-X 146856; (E) holotype USNM 386170; (F) BBM-X 155106; (G) USNM 386225; (H) BBM-X 155105. Scale = 3 cm.

Distribution: Molokai: Moomomi and Ilio Point dunes.

Etymology: Greek, *geleches*, sleeping on the ground; from the accumulations of fossil pellets and bones, both on Molokai and Kauai, indicating that owls of this genus roosted at times on open sand dunes or in low dune vegetation.

Measurements (mm) of holotype: Rostrum: length from nasofrontal hinge, 33.8; width at juncture of quadratojugals, 19.0; width at nasofrontal hinge, 14.0; length of premaxillary symphysis from anterior margin of nasal fossa, 14.1; length of nasal fossa, 13.5. Cranium: length from nasofrontal hinge, 44.3; width across postorbital processes, 44.8; depth through occipital condyle, 28.4. Quadrate: dorsoventral depth, 15.3. Mandible: length, 49.4; length and posterior width of symphysis, 8.4 × 8.5; width of articulation through internal process, 13.1. Furcula: length, 42.2. Sternum: length along midline, 42.6; width across second costal facet, 28.1; depth through apex of carina, 18.2. Scapula: length, 49.0. Pelvis: length of sacrum along midline, 42.8; width through antitrochanters, 33.8; greatest diameter of acetabulum, 5.8; greatest diameter of ilioischiatric fenestra, 10.0. Humerus: length, 80.2; proximal width, 16.3; shaft width at midpoint, 5.2; distal width, 14.8. Femur: length, 64.1; proximal width, 12.4; shaft width at midpoint, 5.3; distal width, 13.2. Tarsometatarsus: length, 85.0; proximal width, 12.3; shaft width at midpoint, 5.1; distal width, 12.8. Pedal phalanges (greatest length): Digit I—p1, 14.4; p2, 12.8. Digit II—p1, 10.4; p2, 19.2; p3, 18.2. Digit III—p1, 8.6; p2, 12.5; p3, 15.9; p4, 17.3. Digit IV—p1, 4.9; p2, 3.9; p3, 4.8; p4, 12.4; p5, 13.5.

Paratypes: Length measurements (mm) follow in parentheses when available. Associated rostrum and anterior portion of mandible, BBM-X 147272-3; anterior

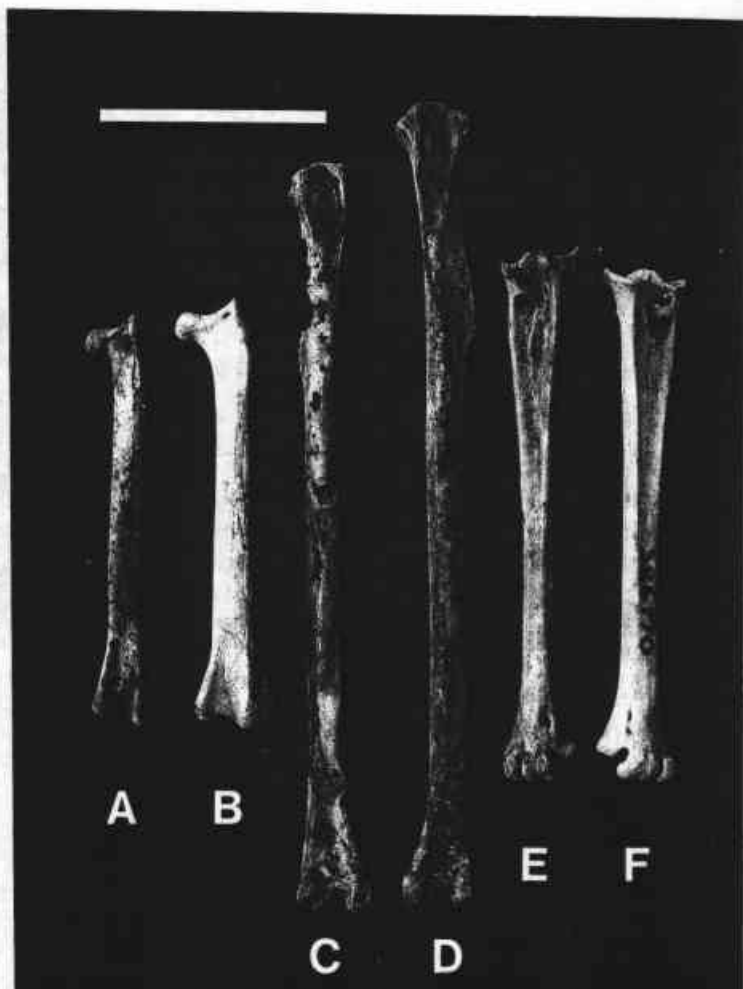


FIG. 29. Hindlimb elements of *Grallistrix erdmani*, new genus and species, holotype USNM 426129 (A, C, E), compared with *Grallistrix orion*, new genus and species (B, D, F); A, B, femora (B, BBM-X 155517); C, D, tibiotarsi (D, USNM 386175); E, F, tarsometatarsi (F, holotype USNM 386170). Scale = 3 cm.

portions of sterna, USNM 386166, BBM-X 147555; right coracoid, BBM-X 147983 (39.8) (Fig. 21D); proximal end of left humerus, USNM 386162; distal ends of right humeri, BBM-X 146737, BBM-X 146854; distal two-thirds of left humerus BBM-X 146628; right radius, BBM-X 152584 (84.0); right ulna, USNM 386150 (84.4); left ulnae, BBM-X 147320 (85.2), BBM-X 152434 (87.0) (Fig. 21B); left carpometacarpi, BBM-X 147322 (40.8), USNM 386164 (41.3) (Fig. 21C); left femora, BBM-X 146630 (62.5), BBM-X 147327 (64.9); right femur, BBM-X 146614 (65.0); right tibiotarsus BBM-X 147928 (116) (Figs. 22B, 27B); right tarsometatarsus, BBM-X 146685 (82.6) (Fig. 28B); left tarsometatarsi, BBM-X 146815 (78.0) (Fig. 28C), BBM-X 146855/6 (76.4) (Fig. 28D).

Measurements of paratypes: See above.

Diagnosis: Larger than *Grallistrix orion* or *G. erdmani* (Table 4). Differs from

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 Seaverns, 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,