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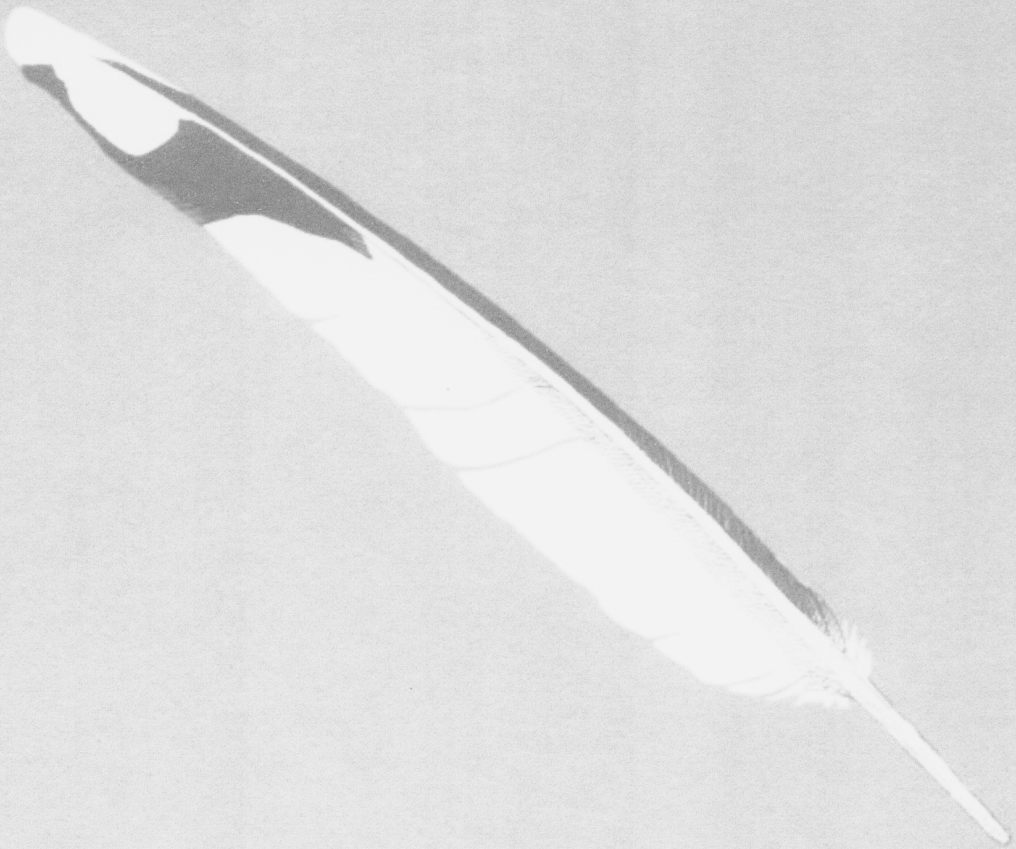

Avian Community, Climate, and Sea-Level Changes in the Plio-Pleistocene of the Florida Peninsula

by

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30196; right femur, UF 30212; two proximal right femora, UF 30210, 30211; two distal right femora, UF 30213, 30214; proximal right tibiotarsus, UF 30215; four distal right tibiotarsi, UF 30217–30220; left tibiotarsus missing proximal end, UF 30216; right tarsometatarsus, UF 30226; two left tarsometatarsi, UF 30223, 30224; distal right tarsometatarsus, UF 30225; distal left tarsometatarsus, UF 30222; pedal phalanx, UF 30221.

Inglis 1C: distal left tibiotarsus, UF 165568.

Discussion.—*Otus asio* commonly occurs in the fossil record of Florida as indicated by the amount of material reported here and from several other late Pleistocene sites in the state. The specimens from Inglis 1A represent the earliest fossil occurrence of *O. asio* in Florida.

Bubo virginianus (Gmelin 1788)

Referred material.—Cutler Hammock: distal left humerus, UF 159177; distal left ulna, UF 159073.

Inglis 1A: right humerus with ends damaged, UF 30159; right ulna, UF 30160; left ulnare, UF 30158; proximal right femur, UF 30161; distal left radius, UF 30162; right acetabulum, UF 30163; distal right tibiotarsus, UF 30166; two distal left tibiotarsi, UF 30164, 30165; two pedal phalanges, UF 30176, 30177.

Description.—This material compares well in size and features to the living species. Only one fossil species of the genus, *Bubo sinclairi* from the late Pleistocene of California and Utah (Miller 1911b; Emslie and Heaton 1987), is known from North America. This species, however, was much larger than *B. virginianus.*

Discussion.—*Bubo virginianus* also has been reported from the Irvingtonian sites at Leisey 1A and Coleman 2A, Florida (Ritchie 1980; Emslie 1995a). Although *B. virginianus* is well known from late Pleistocene and Holocene sites in western North America (Brodkorb 1971), the record from Cutler Hammock is the first from the dozens of localities of this age in Florida. The Great Horned Owl is a common resident throughout much of the state today (Stevenson and Anderson 1994).

Glaucidium explorator, new species
(Fig. 13B)

Holotype.—Left tarsometatarsus, UF 30185.

Type locality and age.—Inglis 1A, Sec. 8, T17S, R16E, Citrus County, Florida; late Pliocene (early Irvingtonian), 2.0–1.6 Ma (Morgan and Hulbert 1995).

Paratypes.—Two proximal right scapulae, UF 30189, 30190; proximal right humerus, UF 30192; proximal right femur, UF 30183; left femur, UF 30187; distal left femur, UF 30188; right tibiotarsus, UF 30193 (Fig. 13A); two distal left tibiotarsi, UF 30194, 30195; shaft left tibiotarsus, UF 30191; proximal left tarsometatarsus, UF 30186; distal right tarsometatarsus, UF 30184.

Measurements.—See Tables 12 and 13.

Diagnosis.—Tarsometatarsus (UF 30184–30186) distinguished as a species of *Glaucidium* by shaft short and begins to flare outward to proximal end at midshaft, tubercle for tibialis anticus placed low on anterior shaft, and distal tendinal opening placed near to external trochlea (Fig. 13B; shaft longer and narrower with tubercle positioned higher on shaft in *Aegolius*; shaft begins flaring nearer proximal end in *Ciccaba, Micrathene, Pseudoscops, Rhinoptynx, Ninox, Asio,*

FIG. 13. Anterior (left) and posterior (right) views of (*A*) the paratype right tibiotarsus (UF 30193) and (*B*) holotype left tarsometatarsus (UF 30185) of *Glaucidium explorator*, new species, from Inglis 1A, Florida. Scale 2×; bar = 1 cm.

Strix, Athene, Pulsatrix, Nyctea, Otus, Tyto, and *Bubo*; shaft shorter and more robust in *Surnia*; and distal tendinal opening farther from external trochlea in *Pseudoscops, Rhinoptynx, Pulsatrix, Nyctea, Bubo,* and *Otus*). Femur (UF 30183, 30187, 30188) recognized as *Glaucidium* by short neck leading to head, in proximal view, and shallow fibular groove (neck longer in *Aegolius* and *Micrathene*; and groove deep in *Aegolius*). Tibiotarsus (UF 30191, 30193, 30195) recognized as *Glaucidium* by weakly developed shelf at groove for peroneus profundus, papilla for muscle attachment at distal internal shaft positioned low on shaft, and distal anterior shaft deeply excavated (Fig. 13A; shelf well developed to moderately developed in *Aegolius* and *Micrathene*; distal papilla higher on shaft in *Micrathene, Athene, Ninox, Strix, Pseudoscops, Rhinoptynx, Ciccaba, Pulsatrix, Bubo, Tyto,* and *Otus*; and shaft only shallowly excavated in *Aegolius, Micrathene, Ciccaba, Surnia, Tyto,* and *Otus*).

Tarsometatarsus (UF 30185) differs from that of other species of *Glaucidium* by straight, robust shaft (shaft narrower in *G. gnoma* and *G. siju,* longer with broader distal end in *G. brasilianum,* and flares outward above mid-shaft in *G. gnoma, G. brasilianum, G. siju, G. brodiei,* and *G. perlatum*; Table 13), distal tendinal opening positioned near external trochlea (opening positioned farther from external trochlea in *G. siju* and *G. brasilianum*), and in distal view the internal trochlea is positioned more anteriad (trochlea positioned farther posteriad in *G. siju, G. brasilianum, G. brodiei,* and *G. passerinum*). Femur (UF 30187) longer than that in *G. gnoma, G. siju, G. brasilianum,* and *G. minutissimum* (Table 12) and with shorter neck from shaft to head in proximal view (neck longer in

TABLE 12. Measurements (mm) of femora and tibiotarsi of modern pygmy-owls and fossils of *Glaucidium explorator*, new species, and *Glaucidium* sp. from Florida.*

Element/species	L	PB	PD	LBS	LDS	DB	DD
Femur							
Glaucidium gnoma (n = 2♂, 5♀, 2?)							
Mean ± SD	27.1 ± 1.1	5.3 ± 0.2	3.4 ± 0.1	2.2 ± 0.1	2.2 ± 0.1	5.3 ± 0.2	4.4 ± 0.2
Range	24.7–28.4	5.0–5.5	3.2–3.5	2.0–2.4	2.0–2.4	5.1–5.7	4.1–4.7
Glaucidium brasilianum (n = 3♂, 7♀, 5?)							
Mean ± SD	29.1 ± 1.8	5.8 ± 0.4	3.6 ± 0.2	2.5 ± 0.2	2.4 ± 0.2	5.8 ± 0.4	4.7 ± 0.3
Range	26.4–32.8	5.1–6.6	3.2–4.0	2.1–2.9	2.1–2.8	5.1–6.7	4.3–5.4
Glaucidium siju (n = 1♂, 1♀, 1?)							
Mean ± SD	28.0 ± 1.3	5.2 ± 0.4	3.3 ± 0.2	2.2 ± 0.1	2.2 ± 0.1	5.3 ± 0.3	4.4 ± 0.2
Range	26.8–29.8	4.7–5.5	3.0–3.4	2.1–2.4	2.1–2.3	5.0–5.6	4.2–4.7
Glaucidium minutissimum (n = 2♂, 1♀)							
Mean ± SD	26.1 ±1.1	5.1 ± 0.3	3.3 ± 0.2	2.1 ± 0.1	2.1 ± 0.2	5.1 ± 0.3	4.3 ± 0.3
Range	24.9–27.0	4.8–5.3	3.1–3.4	2.0–2.2	1.9–2.3	4.8–5.3	4.0–4.6
Glaucidium explorator							
UF 30183	—	5.3	3.4	2.3	2.2	—	—
UF 30187	29.9	5.8	3.5	2.7	2.5	5.9	4.7
UF 30188	—	—	—	—	—	5.6	4.2
Tibiotarsus							
Glaucidium gnoma (n = 4♀, 1?)							
Mean ± SD	38.7 ± 0.6	4.5 ± 0.2	5.1 ± 0.1	2.2 ± 0.2	1.5 ± 0.1	4.9 ± 0.2	4.4 ± 0.2
Range	37.9–39.4	4.2–4.7	4.9–5.3	1.9–2.5	1.4–1.6	4.6–5.2	4.0–4.8
Glaucidium brasilianum (n = 3♂, 3♀, 5?)							
Mean ± SD	4.9 ± 2.9	4.7 ± 0.2	5.5 ± 0.4	2.4 ± 0.2	1.8 ± 0.2	5.4 ± 0.4	4.7 ± 0.3
Range	38.4–48.0	4.3–5.0	5.0–6.4	2.1–2.9	1.6–2.1	4.8–6.1	4.3–5.2
Glaucidium siju (n = 1♂, 1♀, 1?)							
Mean ± SD	39.6 ± 1.6	4.4 ± 0.3	5.0 ± 0.2	2.5 ± 0.2	1.6 ± 0.1	4.9 ± 0.2	4.2 ± 0.2
Range	38.4–41.9	4.1–4.7	4.8–5.2	2.2–2.8	1.4–1.7	4.6–5.1	3.9–4.4
Glaucidium explorator							
UF 30193	40.3	4.4	4.9	2.6	2.2	5.1	4.1
UF 30195	—	—	—	—	—	5.3	3.8
Glaucidium sp.							
UF 30181	35.8	—	—	2.2	1.8	4.3	3.1
UF 30182	—	4.1	4.9				

* L = length; PB = proximal breadth; PD = proximal depth; LBS = least breadth shaft; LDS = least depth shaft; DB = distal breadth; DD = distal depth.

TABLE 13. Measurements (mm) of tarsometatarsi of modern pygmy-owls and *Glaucidium explorator,* new species, from Inglis 1A, Florida.*

Species	L	PB	PD	LBS	LDS	DB	MTB	MTD
Glaucidium gnoma (n = 1♂, 4♀, 1?)								
Mean ± SD	19.5 ± 0.9	5.3 ± 0.2	5.0 ± 0.2	2.9 ± 0.1	1.8 ± 0.1	5.5 ± 0.1	2.6 ± 0.1	2.7 ± 0.2
Range	17.7–20.2	5.0–5.6	4.5–5.2	2.8–3.1	1.6–1.8	5.2–5.6	2.5–2.7	2.3–3.1
Glaucidium brasilianum (n = 3♂, 4♀, 5?)								
Mean ± SD	21.6 ± 1.6	5.8 ± 0.4	5.5 ± 0.4	3.2 ± 0.2	1.9 ± 0.3	6.0 ± 0.3	2.7 ± 0.2	3.0 ± 0.3
Range	19.8–24.6	5.0–6.4	4.9–6.4	2.9–3.5	1.6–2.4	5.4–6.6	2.4–3.1	2.4–3.4
Glaucidium siju (n = 1♂, 1♀, 1?)								
Mean ± SD	20.2 ± 0.8	5.3 ± 0.3	4.9 ± 0.3	3.0 ± 0.2	1.7 ± 0.1	5.5 ± 0.3	2.4 ± 0.2	2.7 ± 0.1
Range	19.7–21.3	4.9–5.6	4.5–5.3	2.7–3.2	1.5–1.8	5.1–5.8	2.3–2.7	2.5–2.8
Glaucidium explorator								
UF 30184	—	—	—	2.9	1.8	5.3	2.2	2.3
UF 30185	19.9	—	—	3.3	1.9	5.4	2.4	2.7
UF 30186	—	5.2	4.7	—	—	—	—	—

* L = length; PB = proximal breadth; PD = proximal depth; LBS = least breadth shaft; LDS = least depth shaft; DB = distal breadth; MTB = middle trochlear breadth; MTD = middle trochlear depth.

FIG. 14. Anterior view of left tibiotarsus (UF 30181) of *Glaucidium* sp. from Inglis 1A, Florida. Scale 2×; bar = 1 cm.

G. gnoma, G. brasilianum, G. brodiei, G. cuculoides, and *G. perlatum*). Tibiotarsus (UF 30193) with long outer cnemial crest that does not extend as far distad as in *G. gnoma, G. siju, G. brasilianum, G. jardinii, G. brodiei, G. cuculoides, G. perlatum,* and *G. passerinum*; shaft robust (shaft more slender in *G. gnoma, G. siju,* and *G. brasilianum*; Table 12); and papilla for muscle attachment on distal internal shaft positioned low (papilla higher on shaft in *G. siju, G. brasilianum,* and *G. perlatum*). No features were noted in the proximal scapula (UF 30189, 30190) and proximal humerus (UF 30192) that would distinguish them from those of modern pygmy-owls.

Etymology.—From Latin, *explorator,* masculine, for searcher or investigator, in reference to the location of this fossil species far outside the range of living pygmy-owls.

Discussion.—This material represents the first fossil species of *Glaucidium* to be described and the first pygmy-owl to be recorded in eastern North America. Three living species (*G. gnoma, G. minutissimum, G. brasilianum*) occur in western North America and Mexico, and one occurs in Cuba (*G. siju*). The origin of this group of small owls may be from tropical South and Central America, where most species occur today. If so, *G. explorator* may have reached Florida from the tropics along the Gulf Coast corridor during the Great American Interchange in the late Pliocene.

Glaucidium sp.

Referred material.—Inglis 1A: left tibiotarsus with damaged proximal end, UF 30181 (Fig. 14); proximal left tibiotarsus, UF 30182.

Measurements.—See Table 12.

Description.—These fossils are from a small pygmy-owl most similar in size to *Glaucidium minutissimum palmarum.* UF 30181 and UF 30182 differ from *G. minutissimum* in having a longer outer cnemial crest and fibular crest (Fig. 14).