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THE CANINAE OF THE THOMAS FARM MIOCENE

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INTRODUCTION

The generic relationships of the various members of the Caninae from the Florida Miocene have been uncertain ever since Dr. E. H. Sellards first described a new species of *Mesocyon* from the Griscom Plantation in northwest Florida (Sellards, 1916). Our knowledge of the dogs of this epoch in Florida has been greatly increased by the work of Dr. Theodore E. White at the Thomas Farm between 1940 and 1946 (White, 1941, 1942, 1947) and by others who have worked at the site since then. The Thomas Farm locality has been described in those papers dealing with the earlier vertebrate finds (Simpson, 1932; White, 1942).

In carrying out this study all specimens studied by Simpson and by White have been examined, together with a cast of the type of *M. iamonensis* Sellards. In addition, much unstudied Thomas Farm material in the Museum of Comparative Zoology (M.C.Z.), University of Florida, and the Florida Geological Survey (F.G.S.), collected subsequent to the work of Simpson and White, has been available.

The types, or casts of the types, of the following species have been at hand for comparison or have been examined: *Mesocyon hortulirosae* Schlaikjer, M.C.Z. 2882; *M. geringensis* Barbour and Schultz, Univ. Neb. 1902; *M. drummondianus* Douglass, Carnegie Museum 792; *Tomarctus brevirostris* Cope, Amer. Mus. Nat. Hist. 8302, A.M.N.H. 13836 (type of *T. hippophagus* Matthew); *T. optatus* Matthew, A.M.N.H. 18916; *Cynodesmus thomsoni*¹

¹ White (1941, p. 95) refers this species to *Tomarctus*.

Matthew, A.M.N.H. 12874, and *C. thoöides* Princeton Univ. 10412.

As a result of the study presented here, it is evident that the Thomas Farm Caninae are referable to two species representing two genera. These are *Cynodesmus iammonensis* (Sellards) and *Tomarctus canavus* (Simpson). *Tomarctus canavus*, the smaller of the two, and its synonyms, will be discussed first. Complete redescriptions are unnecessary, as they have been given in the original discussions.

TOMARCTUS CANAVUS (Simpson)

Figures 1, 4

Cynodesmus canavus Simpson, 1932, p. 19, fig. 4; White, 1941, p. 91.

Tomarctus canavus (Simpson), White, 1942, p. 8, pls. 2, 6.

Tomarctus thomasi White, 1941, p. 94, pl. 14, fig. 3; 1942, p. 8.

Nothocyon insularis White, 1942, p. 7, pl. 1, fig. 3; 1947, p. 502, fig. 2, D, E.

In Simpson's type description of *Cynodesmus canavus* (F.G.S. V-5260) no mention is made of a comparison between this specimen and *Tomarctus*, although the type of *Cynodesmus nobilis* (F.G.S., V-5255) was compared with this related genus. The talonid of M_1 of the type of *canavus*, though considerably worn, retains enough of the characteristics to definitely identify it as *Tomarctus* (cf. Figure 4). In *canavus* the talonid of M_1 exhibits a ridge between the hypoconid and the entoconid that is characteristic of *Tomarctus*. This species also has two subsidiary cusps anterior to the hypoconid and entoconid respectively, the latter being the more pronounced. These cusps and the cross ridge are not present in *Cynodesmus* or *Mesocyon*. P^4 in the series exhibits a parastyle varying from incipient to small but definite. The lower premolars are less crowded than those of *T. thomsoni*. On comparing *Tomarctus canavus* with the specimens of *Tomarctus brevirostris* Matthew (1924) from the Snake Creek, it was found that the proportions and cusp arrangement were nearly the same, but the specimens of *T. brevirostris* were somewhat larger. White (1942) correctly interpreted *canavus* as having the generic characters of *Tomarctus* rather than of *Cynodesmus*, and referred it to that genus.

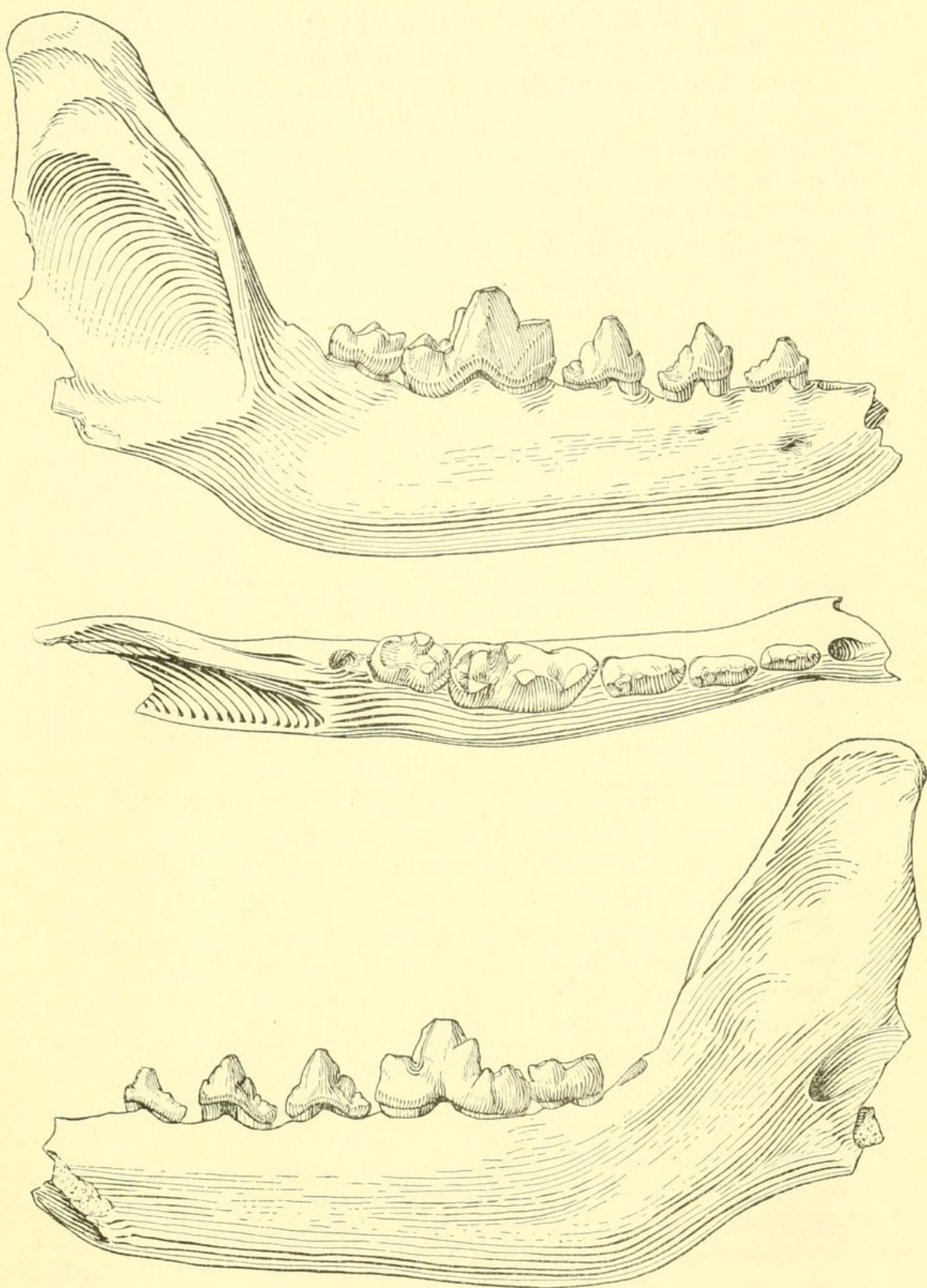


Figure 1. *Tomarctus canavus*, labial, occlusal and lingual views. MCZ 3628. X 1.

Tomarctus thomasi White was based on a partial left maxilla bearing P⁴-M². White originally compared this species only with *T. optatus* and *T. brevirostris*. Later (1942; p. 8), he stated that *thomasi* was slightly larger than *canavus* with relatively larger, more crowded teeth. The differences between M.C.Z. 3628 and 3712 (the specimens that White evidently compared), slight in any case, disappear when the whole series is examined. The species *T. thomasi* cannot be maintained.

Nothocyon insularis was also based on a fragmentary maxilla. White placed the species in *Nothocyon* because of the spacing of the first and second molars, the quadrangular M², and the conical hypocone of M¹, relying largely upon the obtuse posterolateral angle of M² to exclude the species from *Tomarctus*. The spacing of M¹⁻² does not appear to differ markedly from that observed in other members of the series. The hypocone of M¹

MEASUREMENTS IN MILLIMETERS OF DEPTH OF RAMUS UNDER CENTER OF M ₁ , LABIAL									
MCZ + 3628	MCZ ++ 3629	MCZ ++ 3712	MCZ FP 3924	MCZ * 4242	MCZ * 4333	MCZ ++ 4334	MCZ + 4507	MCZ * 5814	MCZ ++ 7148
20.4	19.7	21.9	22.1	18.0	20.0	22.8	19.4	19.0	21.6
* ESSENTIALLY UNWORN					C-CRUSHED, MEASUREMENT				
+ SLIGHTLY WORN					NOT ENTIRELY RELIABLE				
++ MODERATELY WORN									
FP WELL WORN									

is slightly more conical but this is not a profound difference; M.C.Z. 3641, when unworn, may have been entirely comparable in this respect. M² is more quadrangular than in the other two available examples of the tooth. The difference is due to the structure of the external cingulum. This may be regarded as an individual peculiarity. In the description of a referred lower jaw (White 1947, p. 502), he observed that there was little difference between the alveolar length of this specimen and of those referred to *T. canavus*, but that it was more slender throughout, the teeth smaller and shorter crowned, the condyle shorter and smaller, and set at an oblique angle to the horizontal ramus, indicating a broad skull for this form. Experience with Thomas Farm material has shown that exact jaw angles, lengths, depth of rami, etc., are not too reliable, due to the distortion and

cracking that this material has undergone during the process of fossilization. The measurements as given on the opposite page demonstrate the variability in depth of ramus.

As may be seen from the analysis of the dental measurements (Table 1), the teeth referred to *insularis* by White are not significantly smaller than those referred by him to *canavus* and *thomasi*. As he noted, "the heel of the carnassial shows the ridge between the hypoconid and entoconid that is characteristic of *Tomarctus*." There is, in fact, no reason for separating *N. insularis* from *T. canavus*.

CYNODESMUS IAMONENSIS (Sellards)

Figures 2, 3

Mesocyon? iamonensis Sellards, 1916, p. 88, pl. 11, fig. 11; pl. 13, fig. 1;

Simpson, 1930, p. 160.

Cynodesmus? iamonensis (Sellards) Simpson, 1932, pp. 14-19.

Cynodesmus nobilis Simpson, 1932, p. 17, figs. 1-3; White, 1941, p. 91.

Paradaphoenus nobilis (Simpson) White, 1942, p. 5, pl. 2, fig. 1; pl. 3.

Paradaphoenus tropicalis White, 1942, p. 5, pl. 1, fig. 2; pl. 4.

Parictis bathygenus White, 1947, p. 500, fig. 2A (in part, not including type).

This species has been buffeted about somewhat as regards its generic assignment. Sellards, who knew it only from the type, a maxillary fragment with P^4-M^2 ,¹ was quite justified, on that basis, in his tentative assignment to *Mesocyon*, this genus being similar to *Cynodesmus* in the structure of these teeth. Simpson, on the basis of more complete material, including the critical M_1 , referred it to *Cynodesmus* under the name of *C. nobilis*. White placed *nobilis* in *Paradaphoenus* on the grounds that the entoconid and hypoconid of M_1 are of nearly equal size, whereas in *Cynodesmus thoöides*, the type species of the genus, the entoconid is smaller than the hypoconid. However, *Paradaphoenus* possesses M^3 (Wortman and Matthew 1899, p. 129), which *iamonensis* does not, and for this and other reasons such an assignment is not possible. In the present state of our knowledge of the earlier Caninae, Simpson's reference to *Cynodesmus* is the only practicable one. Comparison of Thomas Farm material

¹ The type of *M. iamonensis* was first listed by Sellards as Florida Geological Survey no. 5082, later changed to V-319, and was then sent to the U. S. National Museum and given the permanent number, U.S.N.M. 8836.

TABLE 1						
STATISTICAL DATA ON LINEAR DIMENSIONS OF PERMANENT TEETH OF TOMARCTUS CANAVUS						
VARIATE		N	OR	M	σ	V
P_4	L	6	14.0—16.2	$15.0 \pm .34$	$.83 \pm .23$	5.5 ± 1.6
	W	6	7.0—9.0	$7.9 \pm .32$	$.78 \pm .22$	9.8 ± 2.8
M_1	L	13	11.4—12.8	$12.1 \pm .13$	$.47 \pm .09$	$3.9 \pm .7$
	W	13	13.8—15.2	$14.3 \pm .13$	$.46 \pm .09$	$3.2 \pm .6$
M_2	L	6	7.0—8.4	$7.6 \pm .20$	$.48 \pm .14$	6.3 ± 1.8
	W	6	11.2—14.0	$12.3 \pm .13$	$.33 \pm .09$	$2.7 \pm .7$
P_2	L	6	6.9—8.6	$7.5 \pm .32$	$.80 \pm .23$	10.6 ± 3.1
	W	6	3.4—4.8	$3.8 \pm .21$	$.52 \pm .15$	13.6 ± 3.9
P_4	L	9	9.3—11.8	$10.5 \pm .29$	$.86 \pm .20$	8.2 ± 1.9
	W	9	4.7—5.6	$5.1 \pm .08$	$.26 \pm .06$	5.1 ± 1.2
M_1	L	13	16.3—18.5	$17.0 \pm .22$	$.81 \pm .16$	$4.7 \pm .9$
	W	13	6.7—8.3	$7.3 \pm .13$	$.47 \pm .09$	6.4 ± 1.3
M_2	L	7	9.1—10.2	$9.6 \pm .19$	$.50 \pm .13$	5.2 ± 1.4
	W	6	5.7—6.9	$6.2 \pm .22$	$.53 \pm .15$	8.5 ± 2.5

TABLE 2						
STATISTICAL DATA ON LINEAR DIMENSIONS OF PERMANENT TEETH OF CYNODESMUS IAMONENSIS						
VARIATE		N	OR	M	σ	V
P_4	L	13	14.5—20.0	$18.0 \pm .04$	$1.52 \pm .03$	8.45 ± 1.66
	W	13	7.8—10.0	$9.0 \pm .08$	$.30 \pm .06$	$3.20 \pm .63$
M_1	L	18	9.9—13.8	$12.0 \pm .21$	$.90 \pm .15$	7.50 ± 1.25
	W	18	12.2—15.5	$14.5 \pm .02$	$1.00 \pm .02$	6.98 ± 1.15
M_2	L	17	5.3—7.8	$6.8 \pm .13$	$.56 \pm .10$	8.18 ± 1.40
	W	17	8.5—12.5	$10.7 \pm .02$	$1.03 \pm .02$	9.60 ± 1.65
P_4	L	10	10.9—12.8	$12.0 \pm .17$	$.55 \pm .12$	4.56 ± 1.02
	W	10	5.8—6.8	$6.5 \pm .09$	$.30 \pm .07$	4.65 ± 1.03
M_1	L	13	18.3—21.2	$20.0 \pm .27$	$.97 \pm .19$	8.39 ± 1.65
	W	13	7.7—8.9	$8.4 \pm .11$	$.42 \pm .08$	$4.98 \pm .98$
M_2	L	8	8.6—10.7	$9.9 \pm .28$	$.80 \pm .20$	8.05 ± 2.01
	W	8	5.5—6.9	$6.1 \pm .16$	$.46 \pm .12$	7.55 ± 1.89

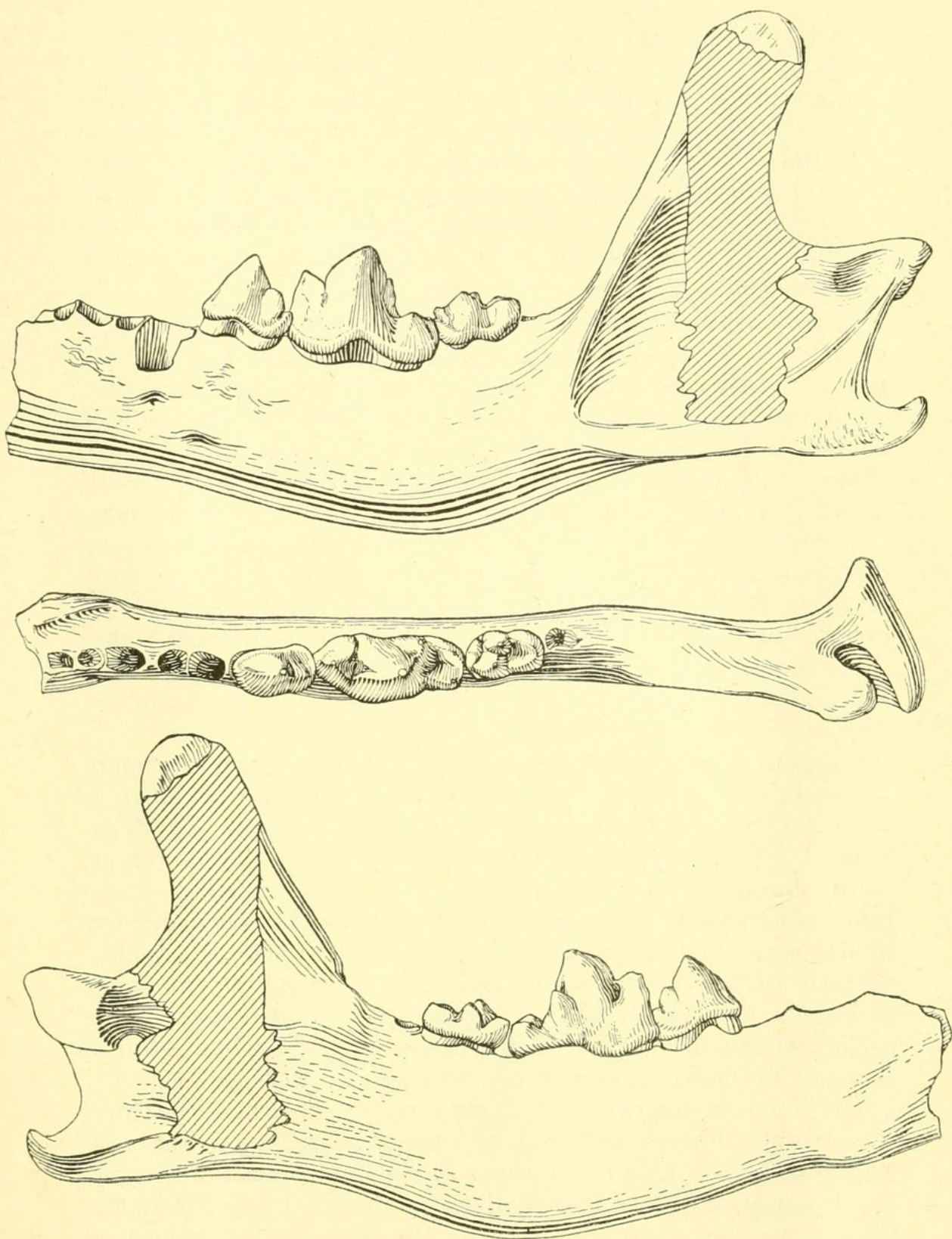


Figure 2. *Cynodesmus iamonensis*, labial, occlusal and lingual views.
MCZ 3714. X 1.

with *C. thoöides* shows a close agreement in structure and proportions, I^3 is rather large relative to I^{1-2} , P^2 is rather large relative to P^3 , and the heel of M_1 is basined. This last feature definitely rules out all possibility of reference to *Mesocyon*, in which M_1 has an unbasined talonid consisting of a large, bluntly pointed, anteroposteriorly elongate hypoconid and a low internal cingulum. With wear, the hypoconid in *Mesocyon* grinds out a circular area in the center of M^1 , a feature not encountered in the *iamonensis* material.

C. iamonensis is readily distinguished from *C. thoöides*; P_{2-3}^{2-3} have lower, less pointed paracones, the protocone of P^4 is relatively smaller, the parastyle of M^1 smaller and less projecting, the hypocone of M^1 more expanded posteriorly and the anterior border of the posterior narial opening opposite M^2 , rather than immediately posterior to M^2 , as in *thoöides*. As White noted (1942, p. 6), the entoconid of M_1 is small in the type of *thoöides*; it is, in fact, subordinated in the internal cingulum, although this is raised to rim a definite basin. In *C. iamonensis* the entoconid of M_1 is usually distinct, but in M.C.Z. 3965 it is completely submerged in the cingulum, which is somewhat higher than, but otherwise identical to, that of the type of *thoöides*. Nothing need be added to Simpson's comparisons (1932, p. 18) with other species referred to *Cynodesmus*.

Simpson (1932, p. 19) regarded the Thomas Farm specimens as specifically distinct from *iamonensis* — the type of which is from the Griscom Plantation — on the basis of larger size, hypocone of P^4 more projecting internally, M^2 "relatively larger, more oblique, hypocone basin stronger and projecting more postero-internally." The present series shows that the difference in size is not significant and that M^2 , in particular, is a highly variable tooth; specimens at hand connect Simpson's paratype of *nobilis* (F.G.S. V-5259) with the type of *iamonensis*. The geological evidence now available indicates that Griscom Plantation and Thomas Farm are of the same age. In 1930 (pp. 160-161, fig. 5) Simpson described some fragmentary canid material from the Franklin Phosphate Company mine as *Mesocyon iamonensis*. This may be referable to *Mesocyon* but certainly not to *iamonensis*. Simpson did not mention these fragments explicitly in his later paper, but they are obviously the basis for his record of

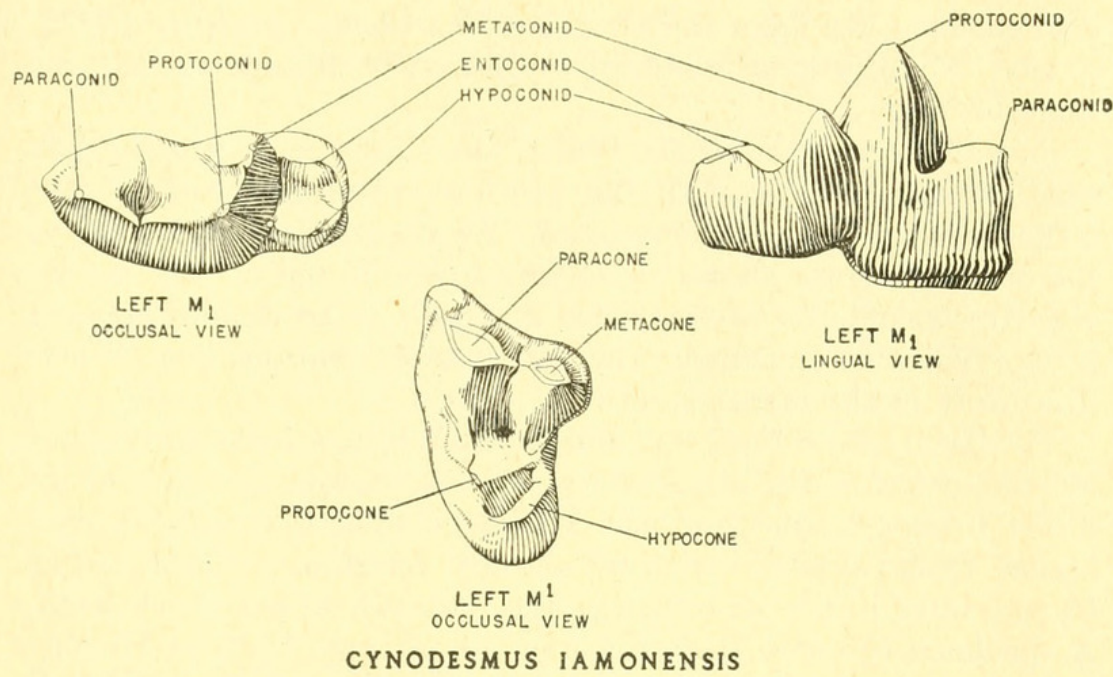


Figure 3. Tooth characters of *Cynodesmus iamonensis*. X 1½.

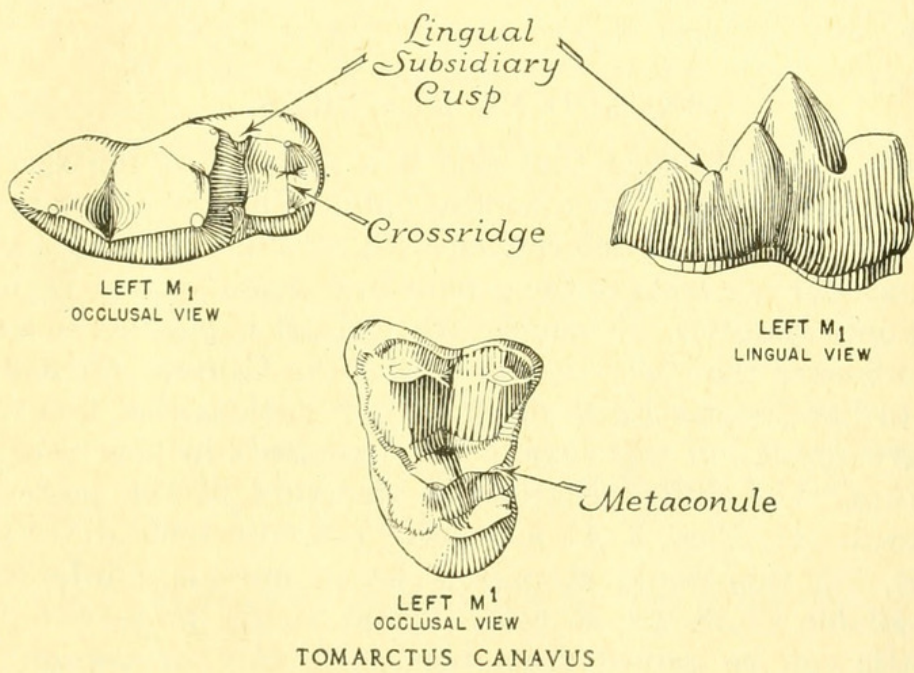


Figure 4. Tooth characters of *Tomarctus canavus*. Key characters indicated by arrows. X 1½.

? *Temnocyon* sp. from the Franklin Phosphate Company (1932, p. 14). No additional material representing this species has yet come to light.

Paradaphoenus tropicalis White was stated to be one-seventh smaller than *nobilis*, with the protocone and metacone of M^2 larger and the hypocone reduced. As regards size, analysis of the measurements shows no significant difference. M^2 is decidedly variable as to total size and also as to details of cusp proportion and structure; the differences mentioned by White disappear in the larger series.

The paratype of *Parictis bathygenus* White, a maxillary, is not morphologically distinguishable from *iamonensis*, and it is of interest in this connection that White noted a very close resemblance to *Mesocyon*, which as already remarked, is not unlike *Cynodesmus* in the structure of the posterior upper cheek teeth. A specimen referred to *Parictis* in the Chicago Natural History Museum, no. P-27157, shows conclusively that the Thomas Farm specimen has nothing to do with this group of canids.¹

Cynodesmus iamonensis is a variable species, both as to size and as to details of dental structure, more so than *Tomarctus canavus*.

CONCLUDING REMARKS

It must be emphasized that this is a revision of the species present in the Thomas Farm deposit only. Whether or not these species are valid can be determined with certainty only by study of all material referable to the genera in question, a task beyond present opportunities. Nomenclature aside, it is possible to state with confidence that only two species of the Caninae are represented in the Thomas Farm deposit. It is curious that two true dogs very similar in size should have coexisted in nearly equal abundance. The differences in the structure of the posterior cheek teeth (cf. Figs. 3, 4) may have reflected some difference in habit, but this would at present be an uncertain inference. The available skulls are so crushed and poorly preserved that very little can be gained from them; the only impression received is that the face anterior to P^4 may have been a little longer in *C. iamonensis*.

¹ The type mandible is not referable to *Parictis* either, a point that will be taken up in a subsequent contribution.

Knowledge of the postcranial skeletons, however, may in the future reveal differences that cannot now be appreciated.

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TOMARCTUS CANAVUS

FIGURED SPECIMENS AND SYNONYMS	M ₁ ANTEROPOSTERIOR DIAMETER	M ₁ GREATEST TRANSVERSE DIAMETER	M ₂ ANTEROPOSTERIOR DIAMETER	M ₂ GREATEST TRANSVERSE DIAMETER
N. insularis MCZ 4507	16	7	--	--
C. canavus FGS V5260	16.5	7.5	9	6
C. canavus MCZ 3629	16.5	7	--	--
T. canavus MCZ 4333	17	7	10	5.5
T. canavus MCZ 4334	17	7.5	10	6.5
T. canavus MCZ 3924	17	7.5	--	--
T. canavus MCZ 3628	18	8	9	6.5
T. thomasi MCZ 3712	18	8.5	10	7.5

CYNODESMUS IAMONENSIS

C. nobilis MCZ 3633	19	7.5	9.5	5.5
C. nobilis MCZ 4521	19	8	9	6
P. tropicalis MCZ 3966	20	8	--	--
P. tropicalis MCZ 3965	20	8	9	5.5
P. tropicalis MCZ 3714	20	8	10	6
C. nobilis FGS V5255	20	8	10	6
P. nobilis MCZ 4330	21	8.5	11	7
P. nobilis MCZ 3724	21	8.5	--	--



Olsen, Stanley John. 1956. "The Caninae of the Thomas Farm Miocene."
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