

Description of dentition of *Pronothodectes gaoi*

P3.—(Figs. 3A-F, J-K, 4O-Q, 9C) *P3* of *P. gaoi* bears three roots, the mesial and lingual of which are subequal in diameter, with the distal root being smaller. The paracone is large and swollen at its base but becomes somewhat labiolingually compressed apically. The metacone is only weakly differentiated from the paracone: the two cusps are connate for nearly their entire height, and their apices are connected by a short, widely notched centrocrista. A weak preparacrista extends mesially from the paracone to a low but prominent parastylar cusp developed at the junction between the ectocingulum and mesial cingulum; an acute notch is present at the deepest part of the preparacrista. The postmetacrista runs distally to join the ectocingulum and distal cingulum; a metastyle is not developed. The ectocingulum is usually strong mesially but weakens considerably distally, and extends to the metastylar corner of the crown in only one specimen (UALVP 46689). A well-developed paraconule arises between the paracone and protocone: it is somewhat labiolingually compressed and ridge-like in most specimens, and is oriented slightly oblique, rather than perpendicular, to the transverse axis of the crown. Conular cristae are not developed. The protocone is lower than the paracone and metacone, is conical, and has its apex canted slightly mesially. A short preprotocrista curves labially towards the paraconule and can bear a small swelling just before it meets the paraconule; the postprotocrista is undeveloped. The mesial cingulum is weak or absent on all specimens at hand; on one (UALVP 31396, Fig. 3F), it joins the preprotocrista before continuing to the parastylar corner of the crown. The distal cingulum extends without interruption along the distal

margin of the crown, fading away as it nears the lingual extent of the protocone; there is no postprotocone fold.

P4.—(Figs. 3A-H, L-Q, 9C) The crown of *P4* is larger and more transverse than that of *P3*, but is otherwise similar. The paracone and metacone are connate for most of their height, the centrocrista is short and shallowly notched, the paraconule is compressed, ridge-like, and obliquely oriented relative to the transverse axis of the crown, the preprotocrista bears a swelling just lingual to its union with the paraconule, and the protocone is conical, with an acute, mesially canted apex. The crown of *P4* differs from that of *P3* in the following ways: 1) the ectocingulum is considerably stronger and is mesiodistally continuous; 2) the parastylar cusp is taller and more robust; 3) the preprotocrista is more sharply defined and extends to the parastyle; 4) the mesial cingulum, although short, is stronger; and 5) a well-defined postprotocone fold is present, sloping distodorsally from the apex of the protocone to the distal cingulum (this in turn imparts a more nearly rectangular occlusal outline to the crown compared to that of *P3*). A short ridge immediately lingual to the paraconule is developed on two specimens (UALVP 46719, 46720, Figs. 3N-Q), with one of these ridges (UALVP 46719, Fig. 3O) bearing a series of small cuspules.

Upper molars.—(Figs. 2M-N, 3A-I, 4A-Q, 9C) *M1* and *M2* of *P. gaoi* closely resemble one another, differing mainly in the crown of *M1* having a more mesially projecting parastylar corner, and in *M2* being slightly longer and wider. The crown of *M3* is nearly equidimensional to that of *M2*, but as in *M3* of other eutherians generally, the metastylar corner is undeveloped and the metacone is somewhat lingual relative to the level of the paracone. The crown of *M1* and *M2* is subquadrate in outline, while that of *M3* is subovate; each of the molars is transverse relative to its length, and bears well-developed cusps and conules. The stylar shelf is reduced,

although not to the same degree as in some species of *Plesiadapis* (e.g., *P. rex*, see Gingerich, 1976: pl. 4H), and the bases of the paracone and metacone are swollen and extend close to the labial margin of the crown. Although the ectocingulum is robust, its continuity along the labial side of the crown on M1 and M2 is variable: on most specimens it is interrupted by a notch near the level of the deepest part of the centrocrista, dividing the cingulum into more or less equal mesial and distal parts (e.g., UALVP 49287, Fig. 4J); on other specimens the notch is undeveloped and the cingulum is continuous (e.g., UALVP 46725, Fig. 4D). The ectocingulum on M3 is continuous to the level of the metacone, at which point it weakens and then fades away. Small cuspsules can occur on the ectocingulum on each of the molars, but a distinct mesostyle like that on upper molars of many species of *Plesiadapis* is not developed on M1 or M2 (e.g., *P. rex*, see Gingerich, 1976: pl. 4H); however, a small mesostyle is present on M3 (Figs. 4M-N). The paracone and metacone narrow apically and are connected to each other by a long and deeply notched centrocrista; the paracone is subequal to or slightly larger than the metacone on M1-2, and its base extends farther lingually; the metacone is reduced on M3. A sharp preparacrista connects the paraconal apex to the heavy ectocingulum and paracingulum; a low and somewhat mesially projecting parastylar spur is developed at the junction of these three crests on M1. The postmetacrista curves distolabially to join the ectocingulum and distal cingulum on M1-2, but is undeveloped on M3. The paraconule and metaconule are swollen and each is closely appressed to the base the paracone and metacone on M1-2, while on M3 the metaconule is absent and the postprotocrista extends to the base of the metacone. Of the conular cristae, only the preparaconular crista is consistently well developed, joining the anterior cingulum and continuing as the paracingulum to the parastylar corner of the crown; the postparaconular crista is weak or absent, and the metaconular cristae are undeveloped. The

trigon basin is broad and the protocone massive, especially on M3 where it occupies nearly two-thirds the width of the crown; the protoconal apex leans mesially on each of the upper molars, with the posterior wall becoming less steep from M1 to M3. The lingual side of the protocone is long and sloping; in some specimens (e.g., UALVP 39301) the lingual wall is especially long, and the enamel terminates as one or two distinct lingual lobes at the junction between the crown and root (e.g., UALVP 46818, Fig. 4M). The protoconal cingula are prominent, especially the wide distal cingulum; the cingula extend to the labial corners of the crown, but fail to meet lingually. The postprotocone fold is sharply defined on each of the molars, forming a conspicuous talon basin as it turns abruptly labially to join the distal cingulum; the talon basin is particularly prominent on M3.

p3-4.—(Figs. 4R-T, 5G-I, 6D-R, 7C) The distal lower premolars of *Pr. gaoi* closely resemble one another and those of other plesiadapids generally, but mainly differ in p4 being slightly taller than p3 and considerably wider. The crowns of p3-4 are premolariform and are dominated by a tall, inflated, and slightly mesially canted protoconid. The crown is faintly sinusoidal in mesial view, with the apex of the protoconid skewed lingually, and the labial side of the crown bulging labially. A short but well-defined paracristid extends mesially from the protoconid apex, while a longer but comparatively weaker protocristid runs distally; neither a paraconid nor a metaconid is developed. The talonid on p3 consists only of a transversely oriented crest that rises to an apex at the longitudinal midline of the crown, where a small cuspule can be developed at its summit; the talonid crest curls mesially at its lingual extremity, forming a weak shelf. The talonid on p4 resembles that on p3, but the talonid crest extends farther lingually, and the low lingual shelf is more prominent. The hypoflexid is mesiodistally short and relatively shallow on both p3 and p4.

m1-2.—(Figs. 4R-T, 5G-L, 6A-F) The *m1-2* in *P. gaoi* differ from one another primarily in *m2* being wider than *m1*, and in having a more closely appressed paraconid and metaconid. The crowns of *m1* and *m2* resemble those of other plesiadapids generally: they are low, with small, bunodont cusps, mesially leaning trigonids, and broad, shallowly basined talonids. The *m1* trigonid bears a well-developed and inflated protoconid and metaconid, and a slightly smaller paraconid that together enclose a shallow trigonid basin; the low paracristid curves mesially and lingually from the protoconid apex to the paraconid, forming a weak mesial shelf. The metaconid is positioned slightly distal to the level of the protoconid, and the two cusps are connected by a shallowly notched protocristid. The *m2* trigonid is wider than that on *m1*, forming a more nearly isosceles triangle in occlusal outline. In contrast with *m1*, the paraconid is large and swollen, taller, and more closely appressed to the metaconid, which is itself reduced in size. The inflated paracristid is low and forms a prominent mesial shelf. The talonid on *m1* and *m2* is wider than the trigonid when measured from the lingual margin of the crown to the swollen labial base, although the basin itself can be narrower. The talonid bears a massive hypoconid and slightly smaller entoconid. The hypoconulid is variably developed on both *m1* and *m2*: it can be a single, mesiodistally compressed cusp (e.g., UALVP 46762, *m1*), whereas on other specimens (e.g., UALVP 46788, *m2*) it is bifid, being transected by a narrow cleft; on still other specimens (e.g., UALVP 46789, *m2*), it is fully incorporated into the postcristid, with barely any swelling indicating its presence. The basin-facing wall of the hypoconid slopes gently mesiolingually towards the deepest part of the talonid basin, whereas those of the entoconid and hypoconulid are steeper. The entoconid is well developed and conical, and the distolingual margin of the crown is squared off. A mesoconid swelling is present on the cristid obliqua, although a distinct cusp is not developed; the cristid obliqua continues to the metaconid

apex on m1 [a “stepped” postvallid of Silcox (2001); Character 29 Appendix Table 6], but joins the postvallid wall low and labial to the level of the protocristid notch on m2. The mesial and distal cingulids are strongly developed on m1 and m2, although they do not meet labially; the mesial cingulid is especially prominent, and on some specimens (e.g., UALVP 46790, m2) one or two small cuspules arise from the cingulid at the hypoflexid.