

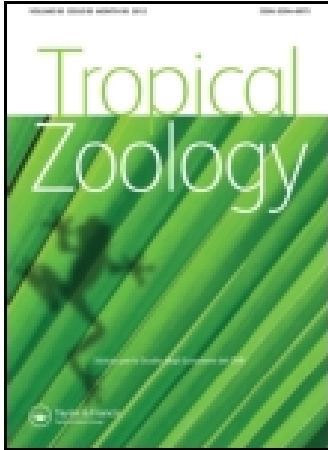
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E. N. Arnold ^a, B. Lanza ^{b,c}, M. Poggese ^c & C. Corti ^c

^a Department of Zoology, Natural History Museum, Cromwell Road, London, SW7 5BD, England

^b Dipartimento di Biologia Animale e Genetica, Università di Firenze, Via Romana 17, 50125, Firenze, Italy

^c Museo Zoologico, Università di Firenze, Via Romana 17, 50125, Firenze, Italy

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Notes on the anatomy and phylogenetic position of *Eremias ercolinii* Lanza & Poggese 1975 (Reptilia Lacertidae)

E.N. ARNOLD¹, B. LANZA^{2,3}, M. POGGESI³ and C. CORTI³

¹ Department of Zoology, Natural History Museum, Cromwell Road, London SW7 5BD, England

² Dipartimento di Biologia Animale e Genetica, Università di Firenze, Via Romana 17, 50125 Firenze, Italy

³ Museo Zoologico, Università di Firenze, Via Romana 17, 50125 Firenze, Italy

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Detailed examination of the only known specimen of *Eremias ercolinii* Lanza & Poggese 1975 shows that it has affinities within the *Ophisops-Mesalina* clade and, on present evidence, is best regarded as a member of *Mesalina* Gray 1838. However, its exact phylogenetic position will only be confirmed when more material becomes available. Limb proportions and scale form suggest that *Mesalina ercolinii* probably spends time in low, dense vegetation.

KEY WORDS: *Eremias*, *Mesalina*, lacertid, phylogeny, nomenclature, structural niche.

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INTRODUCTION

Eremias ercolinii was described from a single female specimen from Bud-Bud in central Somalia (LANZA & POGGESI 1975). This holotype suffered damage to the anterior skull before preservation and also lost much of the tail. The injuries prevent some important features being checked and the sex of the specimen means that the hemipenis cannot be examined. Because of these shortcomings and because a comprehensive account of lacertid generic features was not available when the description was made, it was not possible to allocate *E. ercolinii* precisely and it was placed in *Eremias* Wagler 1830, which was often used at the time for a range of species now

assigned to *Heliobolus* Fitzinger 1843, *Pseuderemias* Boettger 1883, *Pedioplanis* Fitzinger 1843, *Eremias* in its present sense, *Mesalina* Gray 1838 and, in one case, *Acanthodactylus* Wiegmann 1834.

Availability of more detailed information on generic characteristics (ARNOLD 1989) makes it worthwhile to reassess the position of *E. ercolinii*. To this end, the holotype was re-examined in detail and as many as possible of the features known to vary among lacertid genera and species groups were investigated; the main ones excluded are those made unavailable through injury or sex of the holotype and those where examination would have involved substantial damage to the specimen. The findings of this examination are summarised below. Figures in parentheses are those assigned to particular characters by ARNOLD (1989), who often described them more fully. Numbered characters that could not be examined are marked as unchecked. Additional features of *E. ercolinii* may be found in the original description of the species.

MORPHOLOGICAL FEATURES OF *EREMIAS ERCOLINII*

Head-shape very similar to that of *Mesalina* with considerable depression; dorsal scale arrangement on head also similar. Limbs very short: hind-limbs only extending about half way to axillae when turned forward and only overlapping the fore-limbs slightly when these are turned backwards. Head plus body 66 mm, span of fore-limbs 50 mm, span of hind-limbs 63 mm (spans are maximum spread of limb-pairs when they are stretched perpendicularly to body axis; damage to some digits means that some degree of estimation was necessary).

Anterior maxillae not obviously embracing premaxilla (ARNOLD 1991: 805), although damage to the holotype makes this feature difficult to assess with total certainty. Nasal opening of skull large (1). Septomaxilla with a clear anterolateral projection, similar to that in *Mesalina* (ARNOLD 1989: fig. 4e) (2.4). Medial depression on snout well marked (3). Frontal bones narrow between orbits and appearing fused with no suture visible in anterior area exposed by reflecting skin of the snout (4). Dorsal process of maxilla narrow, embraced by frontal (5). Anterior descending process of frontal bone: unchecked (6). Frontoparietal suture simple and lightly bow-shaped (7). Length of parietal bone/length of section bearing osteoderms: more than 1.45. Parietal bone short and wide (9). Pineal fontanelle present (10). Cranial osteoderms not extending to back of parietal bone (11). Postfrontal and postorbital bones separate (12). Postorbital and squamosal bones with extensive overlap. Squamosal and parietal bones separated (13). Squamosal bone slender (14). Quadratojugal process of jugal bone absent (15). Exposure of anterior part of jugal bone on side of skull large (16). No stepping of lower border of jugal (17). Inner crest of jugal bone (18): unchecked. No ossification of temporal scales (19). Lateral teeth bicuspid (20). Scleral ossicles: unchecked (21).

Clavicle with a continuous medial loop (22), which is rather irregular and may possibly have the lumen of the loop filled. Clavicle expanded medially (23). Interclavicle cruciform, arms directed somewhat forward (24). Interclavicle unflanged (25). Sternal fontanelle large, heartshaped (26), central anterior tang not very strongly marked. Three short and two long pairs of nuchal ribs (first pair with left rib abbreviated). Three pairs of ribs attached directly to sternum and two to xiphister-

num. Xiphisternal cartilages separated (27). Number of presacral vertebrae 28. Sexual variation in presacral vertebrae: uncheckable (28). Nine dorsal vertebrae posterior to those attached to xiphisternum with long ribs, followed by five with short ribs and one, immediately presacral, with no ribs visible in radiographs (29). No obvious inscriptional ribs (30). Pattern of transverse caudal vertebrae not fully checkable but may be C-pattern (ARNOLD 1973, 1989) (31): six pygal vertebrae present, the seventh caudal vertebra at least semi-autotomic with more or less double processes that are perhaps roughly parallel; eighth caudal vertebra autotomic with posterior section lost at plane of weakness, so presence or absence of a posterior transverse process cannot be discerned, there is however a small anterior transverse process that is directed obliquely forwards. Phalangeal formulae normal.

Head scaling is illustrated by LANZA & POGGESI (1975: fig. 2). Two superposed postnasal scales (32). Contact between lower postnasal and supranasal scales present (33). Lower postnasal scale contacting rostral broadly (34). Contact between supranasal and anterior loreal scale absent (35). Lower postnasal scale undivided (36). Subocular scale separated from lip, with a strong anterior ridge. No obviously enlarged scale posterodorsal to the subocular, as is usual in for instance *Eremias*. Rostral scale unnarrowed (37). Posterior extremity of prefrontal scale not contacting second supraocular but extending backwards to a level about one third of the way along the first supraciliary. Second supraciliary scale elongate, extending posterior to suture between second and third supraoculars (38). More than one row of supraciliary granules. Parietal scale extends close to border of parietal table (39.2). Occipital scale more or less normal (40). Interparietal scale large (41). No window in lower eyelid (42); scaling on this similar to that of *Mesalina balfouri* (Blanford 1881). No tympanic scale. No masseteric scale (43). Five pairs of chin shields plus one smaller pair (44); only members of pair 1 in complete contact, members of pair 2 in contact for 3/4 of their length.

Collar beneath throat broadly fixed and unreflectable, the six scales that form its greater part lack granules beneath (45.1); 45 scales around body. Mid-dorsal body scales big, quite pointed and keeled (46), not tectate. Lateral body scales similar to dorsals (47). Ventral body scales in eight rows, all of which extend anteriorly more or less to level of axillae, plus a less extensive outer row (48) and some intermediates, that is scales large enough to be ventrals but irregularly arranged and merging with dorsals. No keels on ventral scales (49). Ventrals in straight longitudinal rows (50). Preanal scale broken up (LANZA & POGGESI 1975: fig. 4). Three complete scale rows plus a partial row under thigh between enlarged anterior scale row and femoral pore scales. Femoral pores present and extensive (51). Scales bearing femoral pores flattish (52). Lateral scale rows on fingers absent (53). Lateral scale rows on toes absent (54). Subdigital lamellae keeled, sometimes more than two keels across toe (55). Axillary mite pockets apparently indicated (56). No postfemoral mite pockets (57). Scales bordering mid-line of tail narrow (58). Microornamentation on body scales (59): unchecked. No blue pigment on outer ventral scales (60).

Tongue dark with a pale tip (61). Posterior margin of nostril thick in horizontal section (62). Posterior overhang of nasal vestibule covers the anterior part of concha where it attaches to lateral wall of nasal cavity (ARNOLD 1989: fig. 17b) (63.4). Anterior and posterior extent of kidney (64, 65): unchecked. Insertion of retractor lateralis anterior in front of vent (66): unchecked. Size of retractor lateralis anterior muscle (67): unchecked. Retractor lateralis anterior muscle reaching base of hemipenis (68):

unchecked. Thoracic fascia not apparent (69), but not fully checked. Hemipenial characters (70-78): uncheckable. Female genital sinus (79): unchecked. Exit of oviducts into genital sinus (80): unchecked. Ulnar nerve (81): unchecked. Lateral septum on bodenapneurosis (82): unchecked. Voice (83): uncheckable. Copulatory position (84): uncheckable.

GENERAL PHYLOGENETIC POSITION

The features that have been checked indicate that *E. ercolinii* is a member of the advanced Saharo-Eurasian clade which is otherwise made up of *Eremias* in its narrow sense, *Acanthodactylus*, *Mesalina* and *Ophisops* Ménétriés. This is supported by characters 1, 3.2, 4, 5.2, 7, 8, 9, 11, 15, 26.2, 27, 34, 55, 62.2 and 63.4, all of which are shared with varying numbers of other advanced lacertid genera (see ARNOLD 1989: 238), and by characters 13 and 14 (separation of squamosal and parietal bones and the former being slender) which are confined to the Saharo-Sindian clade among advanced forms. Another probable feature of *E. ercolinii*, having the premaxilla unembraced by the maxillae, is also largely confined to the Saharo-Sindian clade, occurring elsewhere only in two species of *Pedioplanis* (ARNOLD 1991).

Within the Saharo-Eurasian clade, *E. ercolinii* lacks the distinctive narrow rostral scale of *Eremias* and shares with *Mesalina*, *Ophisops* and most *Acanthodactylus* a collar fixed and unreflectable at least in the centre (45.1) and possibly C-pattern caudal vertebrae (31). Within this trio of genera, it lacks the distinctive pattern of peri-nasal scales found in nearly all *Acanthodactylus* (ARNOLD 1983) but shares with *Mesalina* and *Ophisops* an anterolateral process on the septomaxilla (2.4).

These features suggest that the affinities of *E. ercolinii* lie within the clade made up of *Mesalina*, *Ophisops* and their exclusive ancestral lineage. It lacks some of the distinctive attributes of extant *Ophisops*, such as a large eyelid window, eyelid fusion and very reduced collar (45.3), although it approaches this genus in having relatively large, keeled, pointed dorsal scales (46), are quite poorly differentiated from the ventrals, which are in comparatively few complete longitudinal rows (a reversal of character 48.2). However rather similar dorsal scales occur occasionally in *Mesalina*, for instance in some north Egyptian populations presently assignable to *M. olivieri* (Audouin 1829). The hemipenis cannot be checked to see if it has the distinctive features found in that of *Mesalina*, but *E. ercolinii* and this genus share the following features, most of which appear certainly derived: more long anterior free dorsal ribs than short posterior ones (equal number or less in *Ophisops*) (29), a depressed head, generally similar scaling on the pileus, the parietal scale extending laterally towards the edge of the parietal table (39.2), and a frequently large interparietal scale (41.1). The dorsal pattern with dark spots flanked by white is also reminiscent of some *Mesalina*, as is the precise form of the anterolateral projection of the septomaxilla, although the polarity of this feature relative to the condition in *Ophisops* is unknown.

A number of other features occurring in *E. ercolinii* are found in some although not all *Mesalina*. For instance, two rows of supraciliary granules may be present in *M. rubropunctata* (Lichtenstein 1823) and this species may have some irregularity in the separation of dorsal and ventral scales; separation of the subocular from the lip occurs in some *M. breviostris* (Stoliczka 1872) while in *M. olivieri* the tympanic scale may be absent.

E. ercolinii thus appears to be associated with all or part of *Mesalina* and its exclusive ancestral lineage, although precise relationships within this assemblage are as yet unclear. While this is the most appropriate interpretation of the available evidence, a definitive assessment of the phylogenetic position of *Eremias ercolinii* must await the discovery of more material, especially males.

NOMENCLATURE

On present information, it would be simplest and most informative to place *E. ercolinii* in *Mesalina*, as *Mesalina ercolinii*, thereby emphasising its apparent relationships. Clearly it cannot be retained in *Eremias*, a now well-defined assemblage with which it does not share exclusive synapomorphies. The only other possibility would be to assign *E. ercolinii* to a monotypic genus of its own. It does have apomorphies that are not shared with *Mesalina* or indeed *Ophisops*, including substantial separation of the chin shields on the midline, division of the preanal scale, an axillary mite pocket, 28 presacral vertebrae (compared with up to 27 in *Acanthodactylus*, *Ophisops* and *Mesalina*) and short limbs. However, although these set *E. ercolinii* somewhat apart from other *Mesalina* in superficial appearance, they do not negate the significance of the apomorphies that it shares with this genus. The latter suggest real affinity and raising *E. ercolinii* to full genus might possibly make *Mesalina* as presently understood paraphyletic. Also, while some apomorphies of *E. ercolinii* are not shared with *Mesalina* they are not unique features and occur sporadically elsewhere among the lacertids, although not in character combinations that suggest alternative affinities. The lack of uniqueness of these characters is another reason for not using them to erect a monotypic genus for *E. ercolinii*.

BIOGEOGRAPHY AND STRUCTURAL NICHE

Biogeographically, it is at first sight surprising that *E. ercolinii* is probably a *Mesalina*, since no other member of the Saharo-Sindian clade of lacertids is known to occur in central Somalia, an area occupied by advanced Afrotropical lacertid genera. However, other members of *Mesalina* do occur a few hundred kilometres away on the north Somali coast and on Socotra island.

Although the type locality of *E. ercolinii*, Bud-Bud, was extensively surveyed for reptiles over a number of years, only the holotype was ever obtained, being collected by a local inhabitant. This may indicate that the species has a more secretive mode of life than the other lacertids in the area which are conspicuous and occupy quite open situations. The habitus of *E. ercolinii* appears to corroborate this. The female type has limbs that are short in proportion to head plus body length but fore and hind-limbs are not markedly disparate (hind-limb span/head plus body length: 0.96, fore-limb span/hind-limb span: 0.79). Such extreme proportions do not occur elsewhere in the clade made up of *Philochortus* Matschie 1893 and all its more derived relatives assigned to 10 other genera (ARNOLD 1989). Included here are other *Mesalina* and all the other lacertids of central Somalia. The closest approach is, perhaps significantly, in females of an as yet undescribed species of *Mesalina* from the highlands of southwestern Arabia (*Mesalina* A, ARNOLD 1986). Among other lacertids, such pro-

portions have evolved independently in forms, like *Lacerta vivipara* Jaquin 1787, *L. agilis* Linnaeus 1758, *Adolfus alleni* (Barbour 1914) and *Tropidosaura* Fitzinger 1826 (ARNOLD in press), which spend substantial time in dense low ground-cover, a habitat that is often associated with the development of protective large, keeled, overlapping body scales that have some similarity to those found in *E. ercolinii* (ARNOLD 1989). Lizards using such habitats extensively are often relatively inconspicuous and this may help explain the apparent rarity of the species under consideration. Such environments are likely to occur in the Bud-Bud region which is characterised by two main types of vegetation: subdesert scrub and broken xerophilous open woodland (PICHI-SERMOLLI 1957).

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