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A PRELIMINARY REVIEW OF THE AMPHIBIANS OF ETHIOPIA

MALCOLM J. LARGEN

Department of Zoology, Liverpool Museum, William Brown Street, Liverpool L3 8EN, UK

Provisionally, 60 named species of amphibian are recognized in Ethiopia, of which 14 have been described since 1970. Six genera and 23 species are currently listed as endemic, the great majority of these being clearly associated with montane forest, grassland or moorland at altitudes above 1800 m. The Ethiopian Plateau has evidently provided a refuge for some taxa which have a relict distribution in the mountains of Africa and a major centre for occupation and adaptive radiation by others. Huge areas of Ethiopia remain to be explored biologically and it seems certain that future fieldwork will substantially increase the number of amphibian species recorded. Meanwhile, as destruction of natural habitats by an ever-growing human population becomes increasingly widespread, it is inevitably the threat to montane and forest endemics which gives greatest cause for concern.

THE FAUNA

At the present time, I recognize 60 named amphibian species in Ethiopia, 14 of which have been described since 1970 (Table 1). In fact, the total number of taxa has remained remarkably constant throughout this period; the addition of new species being more or less balanced by the elimination of old names now synonymized or shown to be based upon misidentifications. Hopefully, this equilibrium will soon begin to change, since few suspect names seem to remain on the current list but there is still ample scope for new discoveries. Descriptions of two further species of *Ptychadena* are expected to appear shortly (Largen, in press), included in a paper which also explains the author's reasons for doubting the validity of *P. largeni*. On the other hand, the genus *Phrynobatrachus* is desperately in need of revision, both in Ethiopia and further afield, and the status of *P. zavattarii* and *P. sciangallarum*, each known only from its type material, remains particularly obscure.

In May 1993, as a result of political rather than taxonomic decisions, Ethiopia's former northern province became the independent nation of Eritrea and *Bufo pentoni* Anderson, 1893 disappeared overnight from the Ethiopian faunal list. Two other species, *B. asmarae* and *Conraua beccarii*, ceased to be Ethiopian endemics, although both have distributions clearly centred on the Ethiopian Plateau; as indeed does *Xenopus clivii*, which is reputed to extend also into northwestern Kenya.

An eco-geographic analysis of the Ethiopian species (Table 1) indicates that 52% of the amphibian fauna is primarily associated with savanna habitats - being either widespread in sub-Saharan Africa (17%), distributed more particularly in the Sahelian region (15%), derived from the East African savannas (10%), or centred on those semi-desert areas of Somalia and eastern Ethiopia known as the Somali-arid zone (10%).

In marked contrast, the remaining 29 species in Ethiopia are predominantly montane and/or forest forms, 23 of which (38% of the total) are currently considered to be endemic. Seven of the eight families include endemic representatives, amongst which are six endemic genera: *Sylvacaecilia, Altiphrynoides, Spinophrynoides, Ericabatrachus, Balebreviceps* and *Paracassina*.

At the species level, *Bufo langanoensis* is at present known only from the Ethiopian Rift Valley, but it seems unlikely to be a true endemic and may eventually prove to be a member of the Somali-arid fauna. Three species, *Sylvacaecilia grandisonae, Leptopelis vannutellii* and *Afrixalus clarkei*, appear to be confined to the tropical deciduous forests of south-western Ethiopia at altitudes below 2200 m, but the great majority of endemics are species most clearly associated with montane forest, grassland or moorland at elevations of 1800 m and above.

Why does Ethiopia boast such a significant array of high altitude endemics? Quite simply, because the country affords an impressive area of montane habitat (Fig. 1). South of the Tropic of Cancer, almost 50% of all land above 2000 m and nearly 80% of all land above 3000 m lies within the borders of Ethiopia (Yalden, 1983). This vast plateau (Fig. 2), divided by the Rift Valley into north-western and south-eastern massifs, with an average altitude of about 2200 m but rising to more than 4600 m in the Simien Mountains, has had a profound effect upon the evolution, composition and distribution of the flora and fauna in north-east Africa. It not only provides a habitat for a unique assemblage of montane species, including numerous endemics, but also delimits the ranges of many other taxa which extend into the marginal lowlands from neighbouring territories. Species characteristic of the East African savannas, of the sub-Saharan savanna belt, of the North African deserts and of the Somali-arid zone meet and, in varying degrees, mingle around the edges of the Ethiopian Plateau.

For several years, I somewhat arbitrarily defined this plateau as being land above 2000 m, but it has gradually become apparent that, for many of the montane endemics (including mammals and reptiles as well as

TABLE 1. Provisional checklist of Ethiopian amphibians. *, status uncertain; E, Endemic (38%); EAM, E. African montane (5%); EAS, E. African savanna (10%); EP, Ethiopian Plateau (5%); PAS, Pan-African savanna (17%); SA, Somali-arid (10%); WAS, W. African savanna (15%). Species now recognized: 60

	SPECIES	ZOOGEOGRAPHIC CODE	ALTITUDINAL RANGE (m)
Caecilidae			
	Sylvacaecilia grandisonae (Taylor, 1970)	E	1500-2180
Pipidae			
	Xenopus clivii Peracca, 1898	EP	
	Xenopus largeni Tinsley, 1995	E	2500-2650
Bufonidae			
	Bufo asmarae Tandy *et al.*, 1982	EP	
	Bufo blanfordii Boulenger, 1882	SA	
	Bufo dodsoni Boulenger, 1895	SA	
	Bufo garmani Meek, 1897	EAS	
	Bufo kerinyagae Keith, 1968	EAM	
	Bufo langanoensis Largen *et al.*, 1978	E?	800-1585
	Bufo lughensis Loveridge, 1932	SA	
	Bufo maculatus Hallowell, 1854	PAS	
	Bufo regularis Reuss, 1834	WAS	
	Bufo steindachneri Pfeffer, 1893	WAS	
	Bufo xeros Tandy *et al.*, 1976	WAS	
	Altiphrynoides malcolmi (Grandison, 1978)	E	3200-4000
	Spinophrynoides osgoodi (Loveridge, 1932)	E	1950-3520
Ranidae			
	Cacosternum boettgeri (Boulenger, 1882)	EAS	
	Conraua beccarii (Boulenger, 1911)	EP	
	Ericabatrachus baleensis Largen, 1991	E	2400-3200
	Euphlyctis occipitalis (Günther, 1858)	PAS	
	Hildebrandtia macrotympanum (Boulenger, 1912)	SA	
	Hylarana galamensis (Duméril & Bibron, 1841)	PAS	
	Phrynobatrachus bottegi (Boulenger, 1895)	E?	
	Phrynobatrachus minutus (Boulenger, 1895)	E?	
	Phrynobatrachus natalensis (Smith, 1849)	PAS	
	Phrynobatrachus sciangallarum (Scortecci, 1943)*		
	Phrynobatrachus zavattarii (Scortecci, 1943)*		
	Ptychadena anchietae (Bocage, 1867)	EAS	
	Ptychadena cooperi (Parker, 1930)	E	2500-3100
	Ptychadena erlangeri (Ahl, 1924)	E	1300-2500
	Ptychadena largeni Perret, 1994*		
	Ptychadena mascareniensis (Duméril & Bibron, 1841)	PAS	
	Ptychadena nana Perret, 1980	E	2000-3000
	Ptychadena neumanni (Ahl, 1924)	E	820-3800
	Ptychadena porosissima (Steindachner, 1867)	EAS	
	Ptychadena pumilio (Boulenger, 1920)	WAS	
	Ptychadena schillukorum (Werner, 1907)	PAS	
	Ptychadena schubotzi (Sternfeld, 1917)	WAS	
	Rana angolensis Bocage, 1866	EAM	
	Rana wittei Angel, 1924	EAM	
	Tomopterna cryptotis (Boulenger, 1907)	PAS	
Hemisotidae			
	Hemisus marmoratus (Peters, 1854)	PAS	
	Hemisus microscaphus Laurent, 1972	E	1500-2700

TABLE 1. (continued...)

Microhylidae		
Balebreviceps hillmani Largen & Drewes, 1989	E	3200
Phrynomantis somalicus (Scortecci, 1941)	SA	
Rhacophoridae		
Chiromantis petersii Boulenger, 1882	SA	
Hyperoliidae		
Afrixalus clarkei Largen, 1974	E	820-1800
Afrixalus enseticola Largen, 1974	E	1800-2750
Afrixalus fulvovittatus (Cope, 1861)	WAS	
Afrixalus vittiger (Peters, 1876)	WAS	
Hyperolius balfouri (Werner, 1907)	WAS	
Hyperolius kivuensis Ahl, 1931	EAS	
Hyperolius nasutus Günther, 1864	PAS	
Hyperolius viridiflavus (Duméril & Bibron, 1841)	WAS	
Kassina senegalensis (Duméril & Bibron, 1841)	PAS	
Leptopelis bocagii (Günther, 1864)	EAS	
Leptopelis gramineus (Boulenger, 1898)	E	1900-3900
Leptopelis ragazzii (Boulenger, 1896)	E	1930-3100
Leptopelis susanae Largen, 1977	E	2600-2700
Leptopelis vannutellii (Boulenger, 1898)	E	1500-2200
Leptopelis yaldeni Largen, 1977	E	2000-2700
Paracassina kounhiensis (Mocquard, 1905)	E	2400-3000
Paracassina obscura (Boulenger, 1894)	E	820-3000

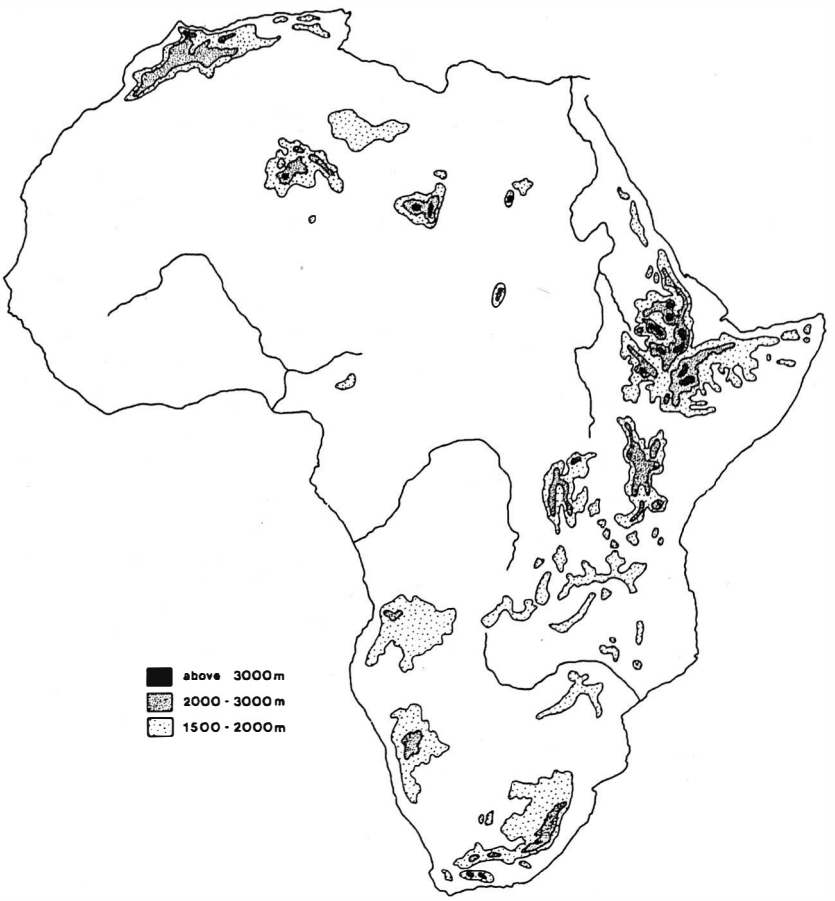

FIG. 1. Distribution of high ground on the continent of Africa.

amphibians), an elevation of about 1800 m is of much greater significance. In fact, only four of the 17 amphibian species categorized as montane endemics are known to occur below this critical limit.

Hemisus microscaphus extends down to 1500 m in the forests of south-western Ethiopia, and it seems that the type locality of *Ptychadena erlangeri* may have been as low as 1300 m. *P. neumanni* appears to have the greatest altitudinal range of any Ethiopian amphibian, assuming that populations found in the Godare Forest at 820 m are conspecific with those from Afro-alpine moorland at 3800 m (and I can find no convincing morphological evidence to suggest that they are different). *Paracassina obscura* is also reported to be present at 820 m in the Godare Forest (Drewes & Roth, 1981).

Even these exceptions conform to a rule that montane species in Ethiopia tend to reach unusually low elevations only at forested sites in the south-western sector of the country, while being conspicuously absent from similar altitudes in the arid grasslands of the south and east. Perhaps species particularly associated with cool, moist environments in the Ethiopian highlands have their wider distributions limited more by humidity than by temperature?

The Ethiopian Plateau has clearly provided a refuge for some taxa which have a relict distribution in the mountains of Africa, and simultaneously an important centre for occupation and adaptive radiation by others, including such large and currently successful genera as *Ptychadena* and *Leptopelis*.

Throughout most of its considerable range in sub-Saharan Africa, *Leptopelis* occurs at low to moderate elevations and rarely extends much above 2000 m, yet in Ethiopia the genus is represented by no fewer than four endemic species that are regularly found higher than 2600 m, including one, *L. gramineus*, which reaches an altitude of 3900 m (Largen, 1977).

Such adaptability appears all the more impressive when it is shown to be far from universal. *Hyperolius*, for example, is known to be represented in Ethiopia by just four species, none of which are endemic and even *H. viridiflavus* seems to be restricted mostly to the foothills of the plateau and not often found much above 2000 m. *Ptychadena, Leptopelis* and even *Afrixalus* demonstrate a capacity to occupy and diversify in montane environments, not excluding Afro-alpine moorland, that *Hyperolius* conspicuously lacks.

Amongst relict populations in the Ethiopian highlands is the brevicipitine species *Balebreviceps hillmani*, found just below the treeline at 3200 m in the Bale Mountains (Largen & Drewes, 1989). Here it is widely separated, both geographically and ecologi-

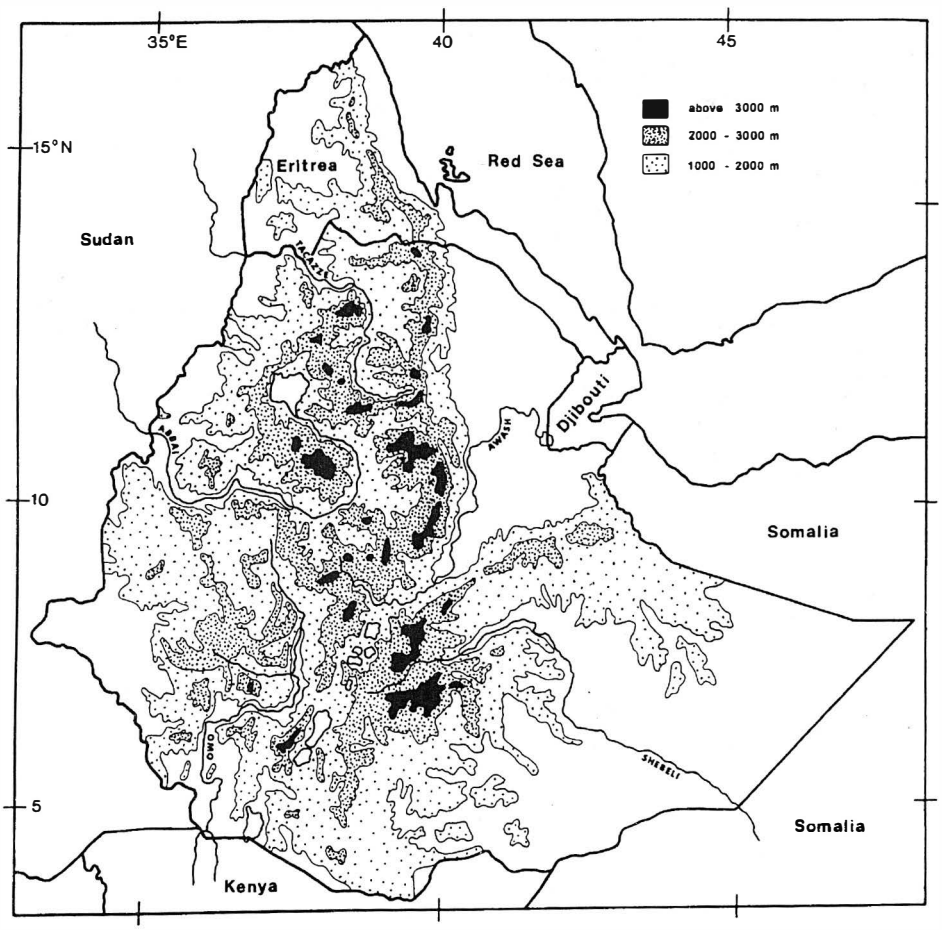

FIG. 2. Distribution of high ground in Ethiopia and Eritrea.

cally, from its nearest relatives - *Probreviceps* in the mountains of Tanzania and Zimbabwe, and *Breviceps* which ranges from Tanzania southwards to the Cape. The discovery of *Balebreviceps* in 1986 raised the still unanswered question of why this subfamily is unknown in the central highlands of Kenya, where there appears to be an abundance of suitable habitat.

It seems significant that a similar discontinuity is encountered when one considers the distribution of the specialized bufonids represented by the monotypic genera *Spinophrynoides* and *Altiphrynoides* on the Ethiopian Plateau, by at least five species of *Nectophrynoides* in the mountains of Tanzania, and by two species of *Nimbaphrynoides* in the Mt Nimba region of West Africa. Are montane populations in southern Ethiopia really so isolated from those in north-eastern Tanzania? Thirty years ago, it might have been claimed that the Kenya highlands were among the more thoroughly-explored regions of Africa, but perhaps our knowledge of this area is more deficient than we sometimes realize.

A final example is provided by the small group of petropedetine frogs with bifid toe tips, that is represented by seven species of *Petropedetes* in the forests of West Africa and by three montane isolates in eastern Africa - including, in this case, a Kenyan population which does provide a geographical link between those in Ethiopia and Tanzania. There are sufficient similarities between *Petropedetes* and *Arthroleptides martiensseni* Nieden, 1910 from the Tanzanian mountains to support a belief that they are congeneric, but *Ericabatrachus* from the Bale Mountains in southern Ethiopia is clearly distinct (Largen, 1991). *Arthroleptides dutoiti* Loveridge, 1935 is known only from the two type specimens obtained on Mt Elgon in Kenya (where it may now be extinct). I have not seen either of these examples, so it is only a reading of the rather brief description of the species which leads me to suspect that *dutoiti* may be more closely allied to *Ericabatrachus* than to *Arthroleptides*.

CONSERVATION OF THE FAUNA

I do not believe that protection of amphibian species is an issue which can yet be meaningfully addressed in most African countries, except within the framework of initiatives aimed at achieving environmental conservation for the benefit of the flora and fauna as a whole. Unfortunately, the historical record sometimes makes it difficult to feel much optimism about the future of any wildlife conservation programme in Ethiopia (Yalden, Largen, Kock & Hillman, 1996).

During the past 50 years, Ethiopia's human population is estimated to have increased eight-fold, from 7 million people in 1940 to 55 million in 1992 (O.P.H.C.C., 1984), and massive destruction of natural habitats has resulted from an ever-growing demand for land and its produce. Forests and woodlands are perhaps most seriously in decline, being felled at an alarming rate to provide timber, fuel-wood and cleared ground for farming. In both the arid lowlands and on the high plateau, more and more marginal land is being forced into temporary cultivation by subsistence farmers, even at altitudes in excess of 3000 m and on slopes so steep that ploughing without adequate terracing makes severe erosion inevitable.

It is now over 30 years since Brown (1965) lamented that "in all of Africa no country has been so brutally ravaged by man", and meanwhile the pace of destruction has scarcely diminished. Huge tracts of once-fertile land have now become so degraded that a relatively slight climate fluctuation is sufficient to render them incapable of supporting the human population, and the result has been the appalling famines and mass migrations of recent decades. All the best efforts of governmental and international organizations with responsibility for wildlife conservation have been thwarted by a seemingly endless succession of social, political and military disasters that have conspired to thrust environmental problems ever further down the list of national priorities. Inevitably, it is the welfare of the most precious elements of the flora and fauna - the montane and forest endemics - which gives the most immediate cause for concern.

It now remains to be seen whether the new civilian government, which has only recently supplanted a long-discredited military dictatorship, will be successful in fostering the social, economic and environmental renewal which the country so desperately needs.

FUTURE PROSPECTS

The preliminary nature of the present review, though due in part to the fact that current research on Ethiopian amphibians has yet to be completed, is far more a reflection of the reality that large areas of the country still remain to be explored by any biologist, let alone visited by a herpetologist.

During three weeks in August 1986, the Harenna Forest Expedition conducted a transect survey on the southern slopes of the Bale Mountains (Largen & Drewes, 1989), obtaining in the process two new genera and three new species of anuran (in addition to a new chameleon, two new shrews and numerous extensions to the previously known ranges of other taxa). If such a brief visit to a comparatively limited area can be so rewarding, it is not difficult to imagine the great wealth of novelties which must await discovery elsewhere on the vast Ethiopian Plateau. A particularly obvious target is offered by mountains in the provinces of Wello and northern Shoa, where extensive tracts of land above 3000 m still require investigation.

I mentioned earlier three amphibian species which appear to be endemic in the dense tropical forests of south-western Ethiopia. This seems a very small number, considering the geographical extent, isolation and ecological diversity of the available habitat, and may well be attributable as much to the inaccessibility of the region in question as to any genuine impoverishment of its fauna.

Neither is it only the mountain and forest areas of Ethiopia which are inadequately known. Arid lowlands

in the extreme east of the country, where the Ogaden region threatens to bisect the Somali Republic, remain a virtual *terra incognita* as far as herpetology is concerned, and no fewer than six amphibian species recorded from central and northern Somalia (Lanza, 1990) are still unknown in Ethiopia. Most, if not all, of these taxa [*Lanzarana largeni* (Lanza, 1978); *Ptychadena mossambica* (Peters, 1854); *Pyxicephalus adspersus* Tschudi, 1838; *P. obbianus* Calabresi, 1927; *Kassina parkeri* (Scortecci, 1932); *K. somalica* Scortecci, 1932] will surely be found in the Ogaden salient, once this region of the country comes to be adequately explored.

I expect the number of amphibians recorded from Ethiopia to be substantially increased in future years - but only after considerable effort has been invested in further fieldwork. Though it may be a long time before the herpetofauna is thoroughly documented and understood, there is no reason to suppose, given the necessary commitment and resources, that this will not eventually be achieved. But what proportion of the Ethiopian fauna, and particularly of the many unique endemics (both known and yet to be discovered), will survive the next century? That seems much more difficult to predict with any degree of confidence, given this country's miserable record of failing to conserve its natural assets.

REFERENCES

Brown, L. H. (1965). *Africa: a natural history*. London: Hamish Hamilton, 299 pp.

Drewes, R. C. & Roth, B. (1981). Snail-eating frogs from the Ethiopian highlands: a new anuran specialization. *Zoological Journal of the Linnean Society* **73**, 267-287.

Lanza, B. (1990). Amphibians and reptiles of the Somali Democratic Republic: checklist and biogeography. *Biogeographia* **14**, 407-465.

Largen, M. J. (1977). The status of the genus *Leptopelis* (Amphibia Anura Hyperoliidae) in Ethiopia, including descriptions of two new species. *Monitore Zoologico Italiano (Nuova Serie) Supplemento* **9**, 85-136.

Largen, M. J. (1991). A new genus and species of petropedetine frog (Amphibia Anura Ranidae) from high altitude in the mountains of Ethiopia. *Tropical Zoology* **4**, 139-152.

Largen, M. J. (in press). Two new species of *Ptychadena* (Amphibia Anura Ranidae) from Ethiopia, with observations on other members of the genus recorded from this country and a tentative key for their identification. *Tropical Zoology*.

Largen, M. J. & Drewes, R.C. (1989). A new genus and species of brevicipitine frog (Amphibia Anura Microhylidae) from high altitude in the mountains of Ethiopia. *Tropical Zoology* **2**, 13-30.

O.P.H.C.C. (1984). *Ethiopia 1984: population and housing census preliminary report*, Vol. 1 (1). Addis Ababa: Office of the Population and Housing Census Commission, 74 pp.

Yalden, D. W. (1983). The extent of high ground in Ethiopia compared to the rest of Africa. *Sinet: Ethiopian Journal of Science* **6 (1)**, 35-39.

Yalden, D. W., Largen, M. J., Kock, D. & Hillman, J. C. (1996). Catalogue of the mammals of Ethiopia and Eritrea. 7. Revised checklist, zoogeography and conservation. *Tropical Zoology* **9**, 73-164.

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