AMERICAN MUSEUM
Novitates

PUBLISHED BY
THE AMERICAN MUSEUM
OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET
NEW YORK, N.Y. 10024 U.S.A.

NUMBER 2614 FEBRUARY 28, 1977

RICHARD G. ZWEIFEL AND FRED PARKER

A New Species of Frog from Australia (Microhylidae, *Cophixalus*)

AMERICAN MUSEUM
Novitates

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET, NEW YORK, N.Y. 10024
Number 2614, pp. 1-10, figs. 1-7 February 28, 1977

A New Species of Frog from Australia (Microhylidae, *Cophixalus*)

RICHARD G. ZWEIFEL[1] AND FRED PARKER[2]

ABSTRACT

Cophixalus saxatilis, described from Black Mountain near Cooktown, Queensland, is the fourth known Australian species of *Cophixalus*. Among the Australian species it is most similar to *C. ornatus*, whereas in New Guinea there are at least six species similar in size and proportions to *C. saxatilis*.

INTRODUCTION

Except for one widespread species of *Sphenophryne* (Cogger, 1975), microhylid frogs in Australia evidently are confined to the Cape York Peninsula of Queensland, where they occur mainly in areas of rain forest along the eastern slopes. Recent accounts (Zweifel, 1962b, 1965; Zweifel and Parker, 1969) record only three species of *Sphenophryne* and three of *Cophixalus* as comprising the Australian microhylid fauna, although to the north, in New Guinea, microhylids are abundant and diverse. However, more intensive collecting continues to add species to the known fauna of Australia. Liem (1973) mentioned *Sphenophryne* among new forms collected, and field work by Parker and others has added the species described herein.

ACKNOWLEDGMENTS

Specimens collected by Parker and deposited in the Museum of Comparative Zoology, Harvard University (MCZ) were made available by Dr. Ernest E. Williams. Those collected by Dr. Gordon Grigg and deposited in the Australian Museum, Sydney (AM) were made available through the courtesy of Dr. Harold Cogger. Dr. Glen Ingram kindly lent a specimen from the Queensland Museum (QM). Additional specimens collected by Parker are in the American Museum of Natural History (AMNH). Charles Tanner of Cooktown provided invaluable assistance during Parker's collecting in the Cooktown area. We thank Frances Zweifel for figure 3.

METHODS

Methods, including measurements, were standardized to agree with earlier work (Zweifel, 1962b; Zweifel and Parker, 1969). All measurements are given in millimeters and were made with Vernier calipers or ocular micrometer, as appropriate. Measurements and their abbreviations are as follows: length from snout to vent (S-V); length of tibia, from heel to fold of skin

[1]Chairman and Curator, Department of Herpetology, the American Museum of Natural History.
[2]Wildlife Branch, Department of Natural Resources, Konedobu, Papua New Guinea.

Copyright ©The American Museum of Natural History 1977 ISSN 0003-0082/Price $1.00

on knee (TL); distance from anterior edge of eye opening to center of external naris (E-N); internarial distance, from center to center of external nares (IN); head width at widest point (HW); diameter of orbit, measured between anterior and posterior edges of eye opening (Eye); horizontal diameter of tympanum, including tympanic ring (Ear).

Cophixalus saxatilis, new species

Holotype. Museum of Comparative Zoology number 90205 (MCZ field number Y-37442), an adult male obtained by Fred Parker at Black Mountain, 13 miles south and 2 miles west of Cooktown, Queensland, Australia, on February 22, 1971.

Paratypes. AMNH 88238-88240 and MCZ 87514, 87515, collected by Fred Parker at the type-locality on May 29, 1973; QM J 27150, obtained by C. J. Corben, G. J. Ingram and A. Smyth on November 18, 1975, at 20 km. south of Cooktown; AM 53981, 53982, collected by J. Barker and G. Grigg at Black Mountain, near Cooktown. (The localities given here are those registered with the specimens; presumably, all paratypes are likewise topotypes.)

Diagnosis. Cophixalus saxatilis may be distinguished from the other three described Australian species of *Cophixalus* by its larger size (reaching at least 32 mm. S-V) and longer hind legs (TL/S-V mean 0.46; fig. 1). The next largest species is *Cophixalus neglectus* Zweifel, which reaches at least 28 mm. S-V but has much shorter hind legs (TL/S-V maximum of 0.33 compared to a minimum of 0.43 in *saxatilis*) and finger discs scarcely wider than the penultimate phalanges (disc of third finger two to three times the width of the penultimate phalanx in *saxatilis*). *Cophixalus ornatus* (Fry) has finger discs as well developed as those of *saxatilis*, but is smaller (maximum S-V about 26 mm.) and has shorter hind legs (maximum TL/S-V, 0.41). The remaining species, *Cophixalus exiguus* Zweifel and Parker, is a tiny frog with a maximum known length of less than 19 mm. and relatively small finger discs (the third finger being narrower than the fourth toe, compared to wider in *saxatilis*). There is some overlap in relative leg length of *exiguus* and *saxatilis*, but individuals of similar size are notably different (see fig. 1). *Cophixalus saxatilis* is compared with Papuan species in a following section.

Description of Holotype. An adult male (fig. 2) with vocal slits in the floor of the mouth shortly anterior to the angles of the jaws.

The head is moderately wide (HW/S-V, 0.387) with rather flat, slightly oblique loreal region, rounded canthus rostralis, and nostrils set close to the rounded tip of the snout. The internarial distance and distance from eye to naris are equal (E-N/IN, 1.00). The eyes are relatively large (Eye/S-V, 0.126), with the upper lid about half the width of the interorbital space. The tympanum is distinct (entire tympanic ring evident) but not prominent; its horizontal diameter is about half that of the eye. A very faint fold of skin passes from the posterior corner of the eye above and down behind the tympanum. Elsewhere the skin of the head and body is smooth, with no folds or evident glandular structures. The legs are relatively long (TL/S-V, 0.435).

The fingers are unwebbed with relative lengths $3 > 4 = 2 > 1$ (fig. 3). The first finger is about half the length of the second, with a terminal disc only slightly broader than the penultimate phalanx. The discs on the other fingers are much broader, being about 2.5 times the phalangeal width. All discs bear terminal grooves. Low, rounded subarticular tubercles are present. The palm is smooth, with broad, rounded inner and outer metacarpal elevations barely discernible.

The toes are unwebbed with relative lengths $4 > 3 > 5 > 2 > 1$ (fig. 3). All bear grooved terminal discs about 1.5 times as broad as the penultimate phalanges. Subarticular tubercles are low and rounded. An elongate, rounded inner metatarsal tubercle is present but there is no distinct outer elevation.

There are no teeth or vomerine elevations. The premaxillae do not overlap one another (eleutherognathine condition). A low, serrate pharyngeal fold is present. The sternum is cartilaginous. Clavicles, procoracoids, and omosternum are lacking.

The head, body, and limbs of the preserved specimen are brown with darker brown markings. A somewhat diffuse dark stripe passes along the canthal region. A similar streak runs from the posterior corner of the eye above and down behind the tympanum, and another extends from the lower edge of the eye along the anterior border of the tympanum, which is distinctly paler

in color. Other markings include obscure dark marks atop the head, a diffuse W-shaped mark in the scapular region and indistinct blotches on the rest of the dorsum. The limbs are obscurely banded, with more distinct bands on the digits. Beneath the animal is pale with a faint dusting of melanophores, which are more heavily concentrated on the chin, front limbs, palms, and soles. No pattern is evident on the ventral surfaces.

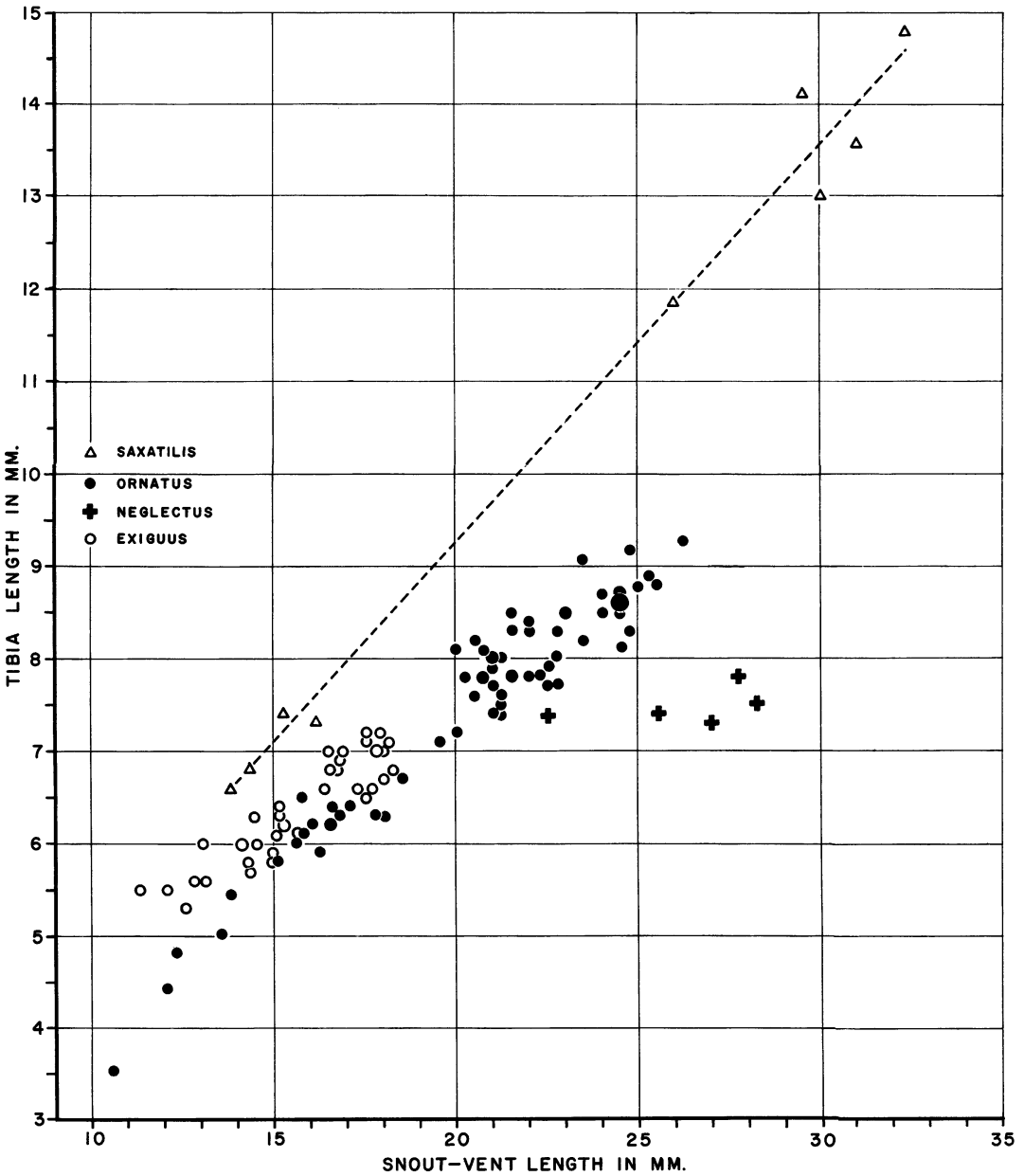

FIG. 1. Relative tibia length in Australian species of *Cophixalus*. The formula for the least-squares regression line plotted is $Y = 0.617 + 0.430X$; $r = +0.933$.

FIG. 2. Holotype of *Cophixalus saxatilis*, MCZ 90205; adult male, SV 31 mm.

In life (fig. 2) the dorsal surfaces were dull yellow-brown with dark translucent purple-brown markings. The iris was silvery above, dark brown below, with dense black venation. The upper eyelid had a distinct white border composed of fine spots. The concealed areas of the groin and knee were dull orange. The ventral surfaces were pale translucent yellow.

Measurements. S-V, 31.0; TL, 13.5; HW, 12.0; Eye, 3.9; E-N, 2.9; IN, 2.9; disc of third finger, 1.8 (penultimate phalanx, 0.7); disc of fourth toe, 1.4 (0.8).

Variation in the Type Series. The holotype is one of four adult males in the series, size range 29 to 32 mm. S-V length. A female paratype (AMNH 88240, fig. 4), at 26 mm. S-V, is relatively large for an Australian *Cophixalus* but appears to be subadult. The remaining four specimens are juveniles measuring 13.9 to 16.2 mm. S-V.

Certain proportions are subject to ontogenetic change, and this is of significance in a series that has a large proportion of juveniles. The eyes are relatively larger in juveniles, and there is a similar tendency for juveniles to have relatively longer legs than adults. We can detect no clear indications of ontogenetic change in the other proportions presented here: TL/S-V, 0.460±0.006 (0.43-0.48); HW/S-V, 0.384±0.006 (0.37-0.42); E-N/IN, 0.926±0.015 (0.87-1.00); IN/S-V, 0.100 ±0.001 (0.093-0.108); E-N/S-V, 0.093±0.001 (0.086-0.101); Eye/S-V, 0.135±0.003 (0.120-0.147).

The disc of the third finger is from 2.1 to 3.4 times as wide as the penultimate phalanx, mean 2.7. Comparable proportions for the disc of the fourth toe are 1.4 to 2.2, mean 1.8. Because of shrinkage of discs in preserved specimens, the ranges of variation given here probably are greater than occur in the living frogs, and the true values may be closer to the upper extremes than to the means. The horizontal diameter of the tympanum is 0.4 to 0.5 times that of the eye in the large specimens and ranges down to about 0.3 in the juveniles with their relatively larger eyes.

The color and pattern are rather similar in all preserved specimens. The juvenile paratypes, the subadult illustrated (fig. 4), and one of the adult paratypes have a somewhat paler background shade than the holotype, so their markings are more contrasting. The indistinct lumbar ocelli evident in the specimen illustrated are even less conspicuous in the holotype, but are distinct in the adult paratypes. The dark canthal mark may occupy much of the loreal region, and the dark mark anterior to the ear varies greatly in intensity among the specimens.

In life, the juvenile paratypes and AMNH 88240 (fig. 4) had fine white flecks throughout the pale dorsal color, and a white to yellow border along the upper eyelid. The juveniles had bright orange on the concealed areas of elbow, groin, and knee, whereas the subadult lacked this color on the forearm. The juveniles were translucent below, with opaque white flecks on throat and anterior belly only.

Comparisons With Other Species. Among the Australian species, *C. saxatilis* is most distinct from *C. neglectus.* The latter, though similar in size to *C. saxatilis*, differs in its narrower digital discs, extremely short legs, and widely spaced nostrils (mean E-N/IN, 0.68). *Cophixalus exiguus* resembles *C. saxatilis* in nostril spacing and relative leg length, but differs in its smaller digital discs and small body size. The Australian species closest morphologically to *C. saxatilis* is *C. ornatus*, which differs mainly in smaller body size and relatively shorter legs.

In the latest published keys to Australian *Cophixalus* (Cogger, 1975; Zweifel and Parker, 1969), *C. saxatilis* would come out to *C. ornatus*. A useful character to separate these species is

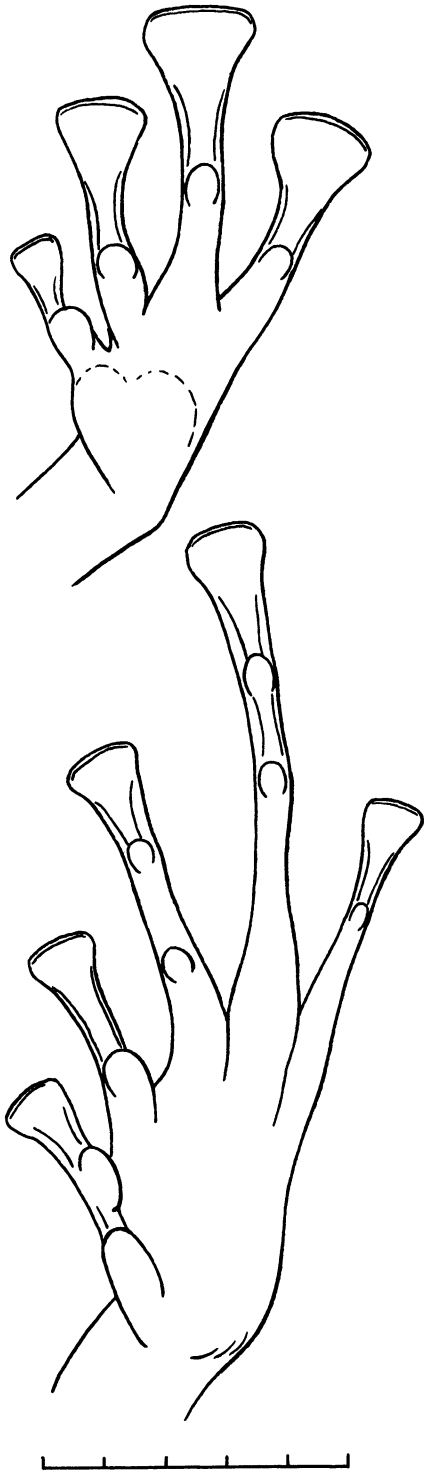

FIG. 3. Left hand and foot of holotype (MCZ 90205) in semi-diagrammatic palmar and plantar views. Scale in mm.

FIG. 4. Paratype of *Cophixalus saxatilis*, AMNH 88240; subadult female, SV 26 mm.

that the TL/S-V ratio reaches a minimum of 0.43 in *saxatilis* and a maximum of 0.41 in *ornatus.*

The metropolis of the genus *Cophixalus* is New Guinea, where 17 described species are recognized and several are known that await description. Among these 17 there are six sufficiently similar to *C. saxatilis* to warrant comparison. These six are approximately the same size as *C. saxatilis* (S-V about 30 mm.) and all have finger and toe discs enlarged to about the same degree as those of *saxatilis*.

Cophixalus biroi (Méhelÿ) is known from moderate elevations on the Huon Peninsula and in the north coast ranges of New Guinea. In leg length and narial measurements it cannot be distinguished from *C. saxatilis*. At least one morphological feature—the relatively larger disc on the first finger of *biroi*—distinguishes the two. Color and pattern are quite different, for *biroi* has a bright reddish color in the groin and on the posterior surface of the thigh, and is more intensely pigmented beneath with melanin than is *saxatilis.*

Cophixalus cheesmanae Parker ranges somewhat closer to Australia than does *C. biroi*, being found in southeastern New Guinea as well as on the north coast. It occurs in foothill rain forest at relatively low elevations. Leg length is as in *C. saxatilis*, but the snout is somewhat more pointed, with the internarial distance less than the distance from eye to naris (usually greater in *saxatilis*). Again, color and pattern are distinctive. *Cophixalus cheesmanae* has bright reddish areas in the groin and on the posterior of the thigh. The entire loreal area usually is dark, and a broad

band of this dark shade continues through the ear region and diagonally down the side of the body. The dark area is quite sharply defined on its dorsal margin.

Cophixalus cryptotympanum Zweifel is a montane species evidently of wide distribution in New Guinea. Proportions are much like those of *C. saxatilis*: TL/S-V ratios of the two species overlap broadly, as do their E-N/IN ratios. Color patterns also are similar, except that the dark markings of *cryptotympanum* are more numerous. The two species are distinguished by the slightly larger disc of the first finger of *cryptotympanum* and more conspicuously by the virtual or complete absence in that species of the inner metatarsal tubercle, which is relatively prominent in *saxatilis.*

Cophixalus nubicola Zweifel is recorded only from an elevation of 10,200 feet on Mount Michael in the Eastern Highlands Province of Papua New Guinea. With relatively short legs (mean TL/S-V, 0.360, range 0.35-0.38) and widely spaced nostrils (mean E-N/IN, 0.689, range 0.63-0.74), it is amply distinct from *C. saxatilis.*

Cophixalus parkeri Loveridge is a montane species of the central highlands of Papua New Guinea (Zweifel, 1962a). It is readily distinguished from *C. saxatilis* by its shorter legs (mean TL/S-V, 0.385, range 0.35-0.44) and more widely spaced nostrils (mean E-N/IN, 0.780, range 0.67-0.92).

Cophixalus verrucosus (Boulenger) differs from *C. saxatilis* and other congeners in that the anterior and posterior surfaces of the thighs are patterned in yellow and black—a black reticulum on a yellow background, or yellow spots on black. Leg and narial proportions are closely similar to those of *C. saxatilis*, but other differences are present. The loreal region of *verrucosus* is vertical rather than slightly oblique, and the canthus rostralis less rounded. The first toe of *verrucosus* is relatively shorter, reaching to the base of the subarticular tubercle of the second toe or slightly beyond, whereas in *saxatilis* it reaches to the anterior edge of the tubercle.

Considering the small suite of characters available and the lack of any firm basis for inferring which character states may be primitive and which derived, it would be premature to attempt to place *C. saxatilis* narrowly in a phylogenetic context. It is reasonable to assume that its relationship is closer to the Papuan species with which we have compared it and to *C. ornatus* in Australia than to other *Cophixalus*. Any finer resolution should await additional information and study.

Etymology. The specific name *saxatilis* is a Latin adjective meaning rock-dwelling, in reference to the habitat on Black Mountain.

Mating Calls. It is established that differences in vocalizations are among the most important mechanisms discouraging interspecific mating between frogs. No objective accounts of the mating calls of Australian microhylid frogs have yet been published, but through the courtesy of Dr. Glen Ingram, Dr. Gordon Grigg, and Dr. David Liem, respectively, we have tape recordings of *Cophixalus saxatilis* and *C. ornatus.* In addition, we are able to describe the calls of four of the six New Guinean species of *Cophixalus* with which we have compared the new species. The distinctiveness of the several calls should leave no doubt as to the specific status of the several taxa involved. More detailed analysis of the calls of the Papuan species is reserved for future publication.

Cophixalus saxatilis (fig. 5A): The call is a series of tapping notes. In a recording made on November 19 (fig. 5A) there are typically 21 to 25 notes in a group (16 instances) but less often fewer (11 once, 18 once). The notes are not well tuned, with energy spread over the region between 1300 and 2300 Hz. The notes are neither finely enough tuned to be heard as "peeps," nor sharply metallic enough to be called "clicks." Each notes has a duration of about 0.03 second, and about 0.19 to 0.15 second elapses between the beginning of one note and the beginning of the next. There is a clear tendency for the internote interval to decrease toward the end of each call-group. A call-group takes from 2.4 to 3.7 seconds to utter (mean 3.4, n = 18). A recording made on January 14 differs in fewer notes per call-group (mean 19.4, range 17-22) and shorter duration of each call-group (mean 2.1 sec., range 1.8-2.5 sec., n = 7). The differences are of a sort that would be expected if the recordings were made at different tempera-

tures. Unfortunately, there are no data on temperature. Data are insufficient to indicate the regularity or repetition rate of call-groups.

The call of *C. saxatilis* cannot be confused with that of any of the species with which it is here compared; nor, indeed, are any of those readily confused with one another. The call of *C. saxatilis* is perhaps most like that of *C. cheesmanae*, a similarity that extends to the common tendency to shorter internote intervals as a call-group progresses.

Cophixalus ornatus (fig. 5C, D): Call notes about 0.5 second in length are uttered every few seconds but not with great regularity, to judge from the recording at hand. The call has a somewhat nasal quality, being too rapidly pulsed (about 270 pulses per second, estimated from the harmonic interval) to be heard as a buzz and too rich in harmonics to sound as a peep or whistle. The chief emphasized harmonic is at about 3000 Hz., but adjacent harmonics are almost as strong.

Cophixalus cryptotympanum (fig. 5B): The call of this species is a monotonously repeated series of peeps that may go on for a minute or more. In the example illustrated, the individual notes are from 0.08 to 0.12 second in length and are given at a rate of about 3.5 notes per second. The rate, of course, could be expected to vary with temperature. The notes are narrowly tuned at about 2500 Hz.

Cophixalus biroi (fig. 5E): This species too has a peeping call, but the individual notes are given less regularly than those of *cryptotympanum* (at roughly one-second to two-second intervals) and bouts of calling in which 10 to 20 peeps may be uttered are interrupted by longer periods of silence. The notes illustrated are about 0.11 second in length and increase in frequency from about 2500 to 2600 Hz. between beginning and end of each note.

Cophixalus parkeri (fig. 6A): The call is a group of buzzing notes, most often four in number, given at infrequent intervals. Each note consists of a series of pulses uttered at a rate that increases slightly during the development of each note. In the example illustrated, the average pulse rate is about 81 pulses per second and most energy is concentrated at about 3300 Hz., with a frequency increase of about 100 Hz. over the duration of the note.

Cophixalus cheesmanae (fig. 6B, C): The call is a series of short, pulsed notes given in groups of about one second in length, with a group being uttered approximately every six seconds. A distinctive feature of this call is that the interval between notes decreases through each call-group, producing a speeding-up effect. In the example illustrated the notes are 0.05 to 0.08 second in length and are composed of from five to 12 individual pulses. The average pulse rate is about 117 pulses per second, and the emphasized frequency is about 2500 Hz.

HABITAT AND BEHAVIOR

The habitat of *Cophixalus saxatilis* is a peculiar one by the standards of Australo-Papuan microhylids, most of which, whether they are terrestrial or arboreal, are creatures of the rain forests. Anonymous (1974) described the habitat and behavior of *C. saxatilis* and provided illustrations of the habitat and of the frog.

Parker collected the types on Black Mountain, part of the striking Black Trevethan Range, which stretches from Mt. Simon, some 19 km. south of Cooktown, for about 5 km. to the southeast where it merges into the rain forest-covered Big Tableland-Mt. Amos ranges. The Cairns-Cooktown road passes through the Black Gap, between Mt. Simon and Black Mountain. The range rises to 350 m. above gently undulating low woodland between the Annan River and Trevethan Creek, and comprises black, rounded boulders with a few solitary bushy trees, but no soil.

The granite boulders, many as large as 10 m. in diameter, are coated with black algae on all surfaces exposed to light, giving the range its color, and providing treacherous footing when wet. The interspaces are warm and humid and can be followed down for considerable distances before they are filled with rock debris. There is no soil even deep among the boulders, but water can be heard at many points, presumably running over bedrock. The occasional patches of vegetation probably mark springs or water flows occurring close to the surface. The specimens taken by Parker were all near a large *Ficus* tree on the western slope of Black Mountain (fig. 7).

The holotype and AMNH 88240 were found at rest on vertical rock surfaces deep among the

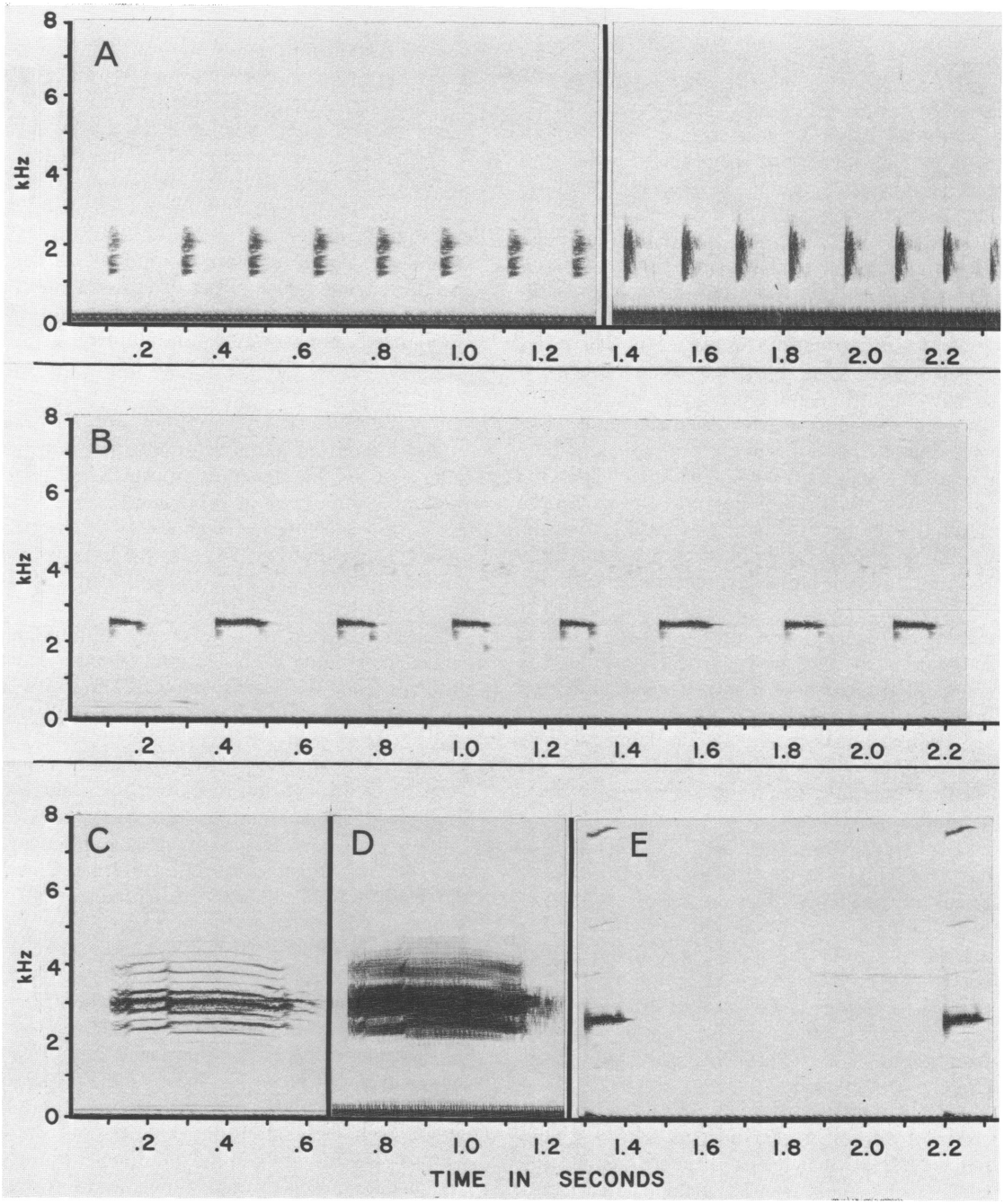

FIG. 5. Audiospectrograms of mating calls of *Cophixalus*. A. *C. saxatilis*, initial eight notes (left, 50 Hz. filter) and terminal eight notes (right, 300 Hz. filter) of a 24-note call-group uttered over a 3.5-seconds span. Recorded by G. Ingram and C. Corben at the type-locality on November 19, 1975. B. *C. cryptotympanum*, AMNH 82942, air and substratum 15.8°C. Recorded by R. Zweifel on the Edie Creek Road, Mt. Kaindi, Morobe Province, Papua New Guinea, on September 8, 1969 (50 Hz. filter). C. *C. ornatus*, air 20°C. Recorded by David Liem on Mt. Spec, Queensland, November 29, 1971 (50 Hz. filter). D. Same as C, 300 Hz. filter. E. *C. biroi*, AMNH 82917, air 19.9°C. Recorded by R. Zweifel at Wanuma, 670 m., Adelbert Mountains, Madang Province, Papua New Guinea, on August 2, 1969 (50 Hz. filter).

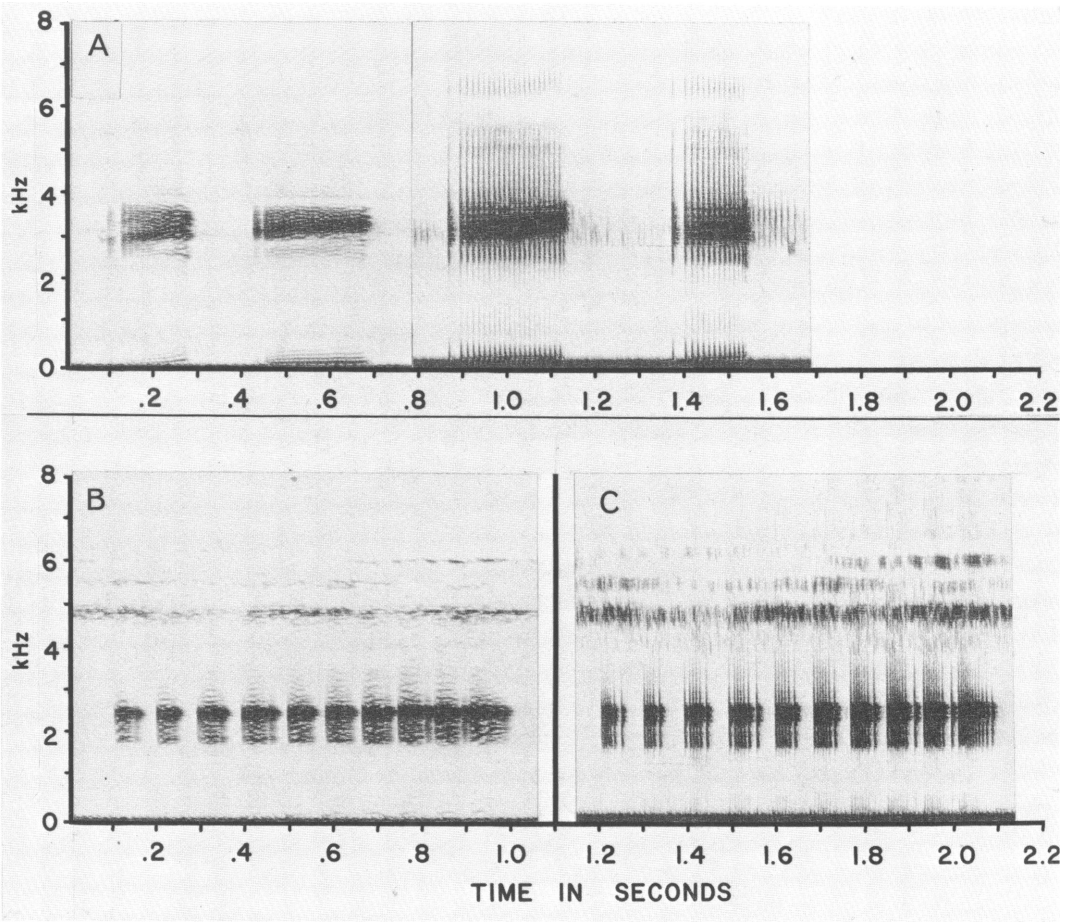

FIG. 6. Audiospectrograms of mating calls of *Cophixalus*. A. *C. parkeri*, AMNH 81139, air 13.6°C., one complete call-group (first two notes, 50 Hz. filter; last two, 300 Hz. filter). Recorded by R. Zweifel on Mt. Kaindi, 2400 m., Morobe Province, Papua New Guinea, on July 22, 1968. B. *C. cheesmanae*, AMNH 74905, air 23.8°C. Topotype recorded by R. Zweifel at Kokoda, 370 m., Northern Province, Papua New Guinea, on July 25, 1964 (50 Hz. filter). C. Same as B, 300 Hz. filter.

boulders in late afternoon. The juveniles were all sheltering on pieces of stone and leaf litter, again deep among the boulders, by day. When disturbed the frogs scurried and jumped rapidly away, often up vertical surfaces. Coming to rest with the body vertical and concealed by the stone, they then would watch the pursuer before moving again, a behavior similar to that of the rock-dwelling skinks and tree monitors.

Despite its barren appearance the range probably is rich in wildlife, especially in moist microhabitats. A large monitor (*Varanus* sp.) and some species of pythons are locally reported to be common. Two geckos (*Cyrtodactylus louisiadensis* and *Gehyra australis*) are common as well as a large, active surface-dwelling skink of the genus *Carlia*, to be described as a new species (Jeanette Covacevich and Glen Ingram, personal commun.). Rock wallabies (*Petrogale*) are frequent and were mentioned by Brass (1953, p. 163). The conditions deep among the boulders are evidently similar in temperature and humidity to those in the rain-forest habitat of the other species of the genus, thus enabling *C. saxatilis*

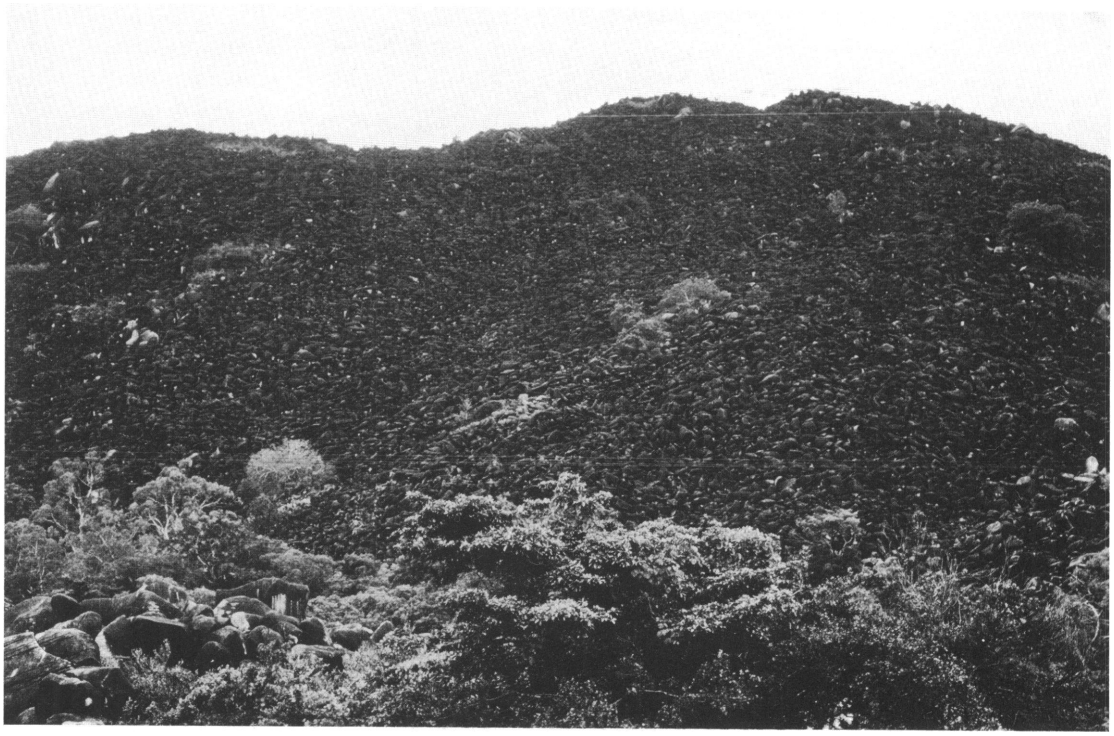

FIG. 7. Habitat of *Cophixalus saxatilis*, photographed from the Cairns-Cooktown road on February 26, 1971. Holotype and paratypes collected by Parker came from close to the large *Ficus* tree in the upper right of the scene.

to exist in what appears to be, on the surface, a completely unsuitable habitat.

LITERATURE CITED

Anonymous [G. C. Grigg]
1974. Frogs? On Black Mountain? Koolewong, Proc. Roy. Zool. Soc. New South Wales, vol. 3, no. 2, pp. 13-14, 4 figs.

Brass, L. J.
1953. Results of the Archbold Expeditions. No. 68. Summary of the 1948 Cape York (Australia) expedition. Bull. Amer. Mus. Nat. Hist., vol. 102, art. 2, pp. 135-206, fig. 1, pls. 41-47.

Cogger, Harold G.
1975. Reptiles and amphibians of Australia. Sydney, A. H. and A. W. Reed, 584 pp., 786 figs.

Liem, David S.
1973. A new genus of frog of the family Leptodactylidae from SE Queensland, Australia. Mem. Queensland Mus., vol. 16, no. 3, pp. 459-470, 3 figs., 1 pl., 1 table.

Zweifel, Richard G.
1962a. Results of the Archbold Expeditions. No. 83. Frogs of the microhylid genus *Cophixalus* from the mountains of New Guinea. Amer. Mus. Novitates, no. 2087, pp. 1-26, 7 figs., 2 tables.
1962b. A systematic review of the microhylid frogs of Australia. *Ibid.*, no. 2113, pp. 1-40, 13 figs., 1 table.
1965. Revisionary notes on Australian microhylid frogs of the genus *Sphenophryne*. *Ibid.*, no. 2214, pp. 1-9, 3 figs., 2 tables.

Zweifel, Richard G., and Fred Parker
1969. A new species of microhylid frog (genus *Cophixalus*) from Australia. Amer. Mus. Novitates, no. 2390, pp. 1-10, 5 figs.