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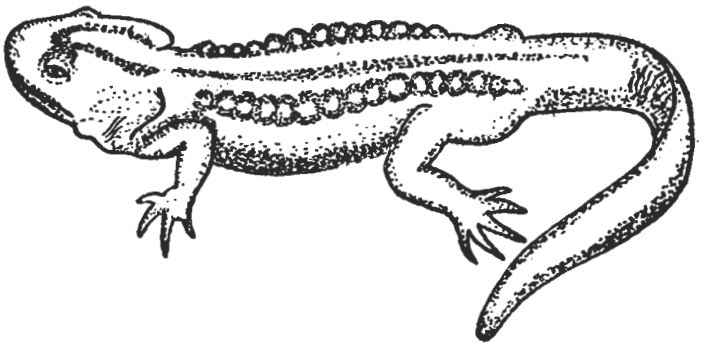

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Contents

Short Communication

Introduction to authors

Manuscripts in English should be submitted in duplicate to the Editor, Journal of Bengal Natural History Society, C/O. Zoology Department, Darjeeling Government College, Darjeeling, West Bengal, India, 734101.

The manuscript may be sent by the Editor to referee/referees inside or outside the country at his discretion. The decision to accept, revise, defer or refuse a paper will be made by the Editor.

It will be assumed that papers submitted to this journal have not been sent elsewhere for publication.

The manuscript will be type-written with double space and with wide margin. Full papers should not normally exceed 12 typed page. Such papers will be organized as follows :

Abstract : Introduction : Material and Methods :
Observations : Results : Discussion : References :

Short communications not so organized may be accepted but such communication should not normally exceed four typewritten pages.

Special articles which may not conferm to the above guidelines may be accepted from specialists in the field from India or abroad.

References should be arranged as follows :

Dasgupta, B. and K. Meedeniya, (195). The vector of *Hepatozoon sciuri*. *Parasitology*, 48, 3 & 4, 419—422.

Garnham, P. C. C. 1966). *Malaria parasites and other Haemosporidia*. Blackwell, Oxford.

Isibasi, A., Garcia-Tomayo, F. and J, y Kumate, 1976). Polisacáridos obtenides de *Entamoeba histolytica* en cultivo axénico. In *Amibiasis : Memorias de la Conferencia international sobre amibiasis*. pp. 89—95. Ed. Sepulveda, B. and L. S. Diamond. Instituto Mexicano del seguro Social. Mexico.

Journal of Bengal Natural History Society
New Series, Vol. 13, No, 1, pp. 1—2, 1994

Editorial :

In this issue of our journal we are publishing a scientific paper on the amphibian communities in southern Vietnam. The work is by Dr David N. Tarkhnishvili of the State University in Georgia. It appears that the work was carried out under the joint auspices of the Government of Vietnam and the Government of the erstwhile Soviet Union, of which Georgia was a constituent part.

The manuscript was received by the editor of this journal from Dr Sergius L Kuzmin of the Institute of Evolutionary Morphology & Ecology of Animals, Russian Academy of Sciences, Moscow, Russia. Dr Kuzmin in his letter forwarding the manuscript to the editor, wrote as follows :

"I have the pleasure of sending you the manuscript of D. N. Tarkhnishvili on amphibians of Vietnam. Tarkhnishvili can't do it personally because of failure of postal services in Georgia and he submitted this manuscript to me through an envoy. This work is dedicated to the numerous problems of amphibian systematics, geography and ecology (especially) in Vietnam. It also contains valuable descriptions and illustrations of adults and tadpoles, many of which are reported for the first time. All the work have been conducted on high scientific level. It may be especially interesting for zoologists from India and other countries of tropical south Asia because of many similarities in amphibian species composition with Vietnam."

Dr Kuzmin further states that in the event of publication of this paper in this journal all correspondence may be made to him and not to Dr Tarkhnishvili who will not be available for a reply in view of the total failure of the concerned postal services on account of the on-going civil war in Georgia.

In view of its high standard we are publishing this paper in our journal and we hope that this will serve to consolidate the scientific contacts between Vietnam, Georgia and Russia on the one hand and India on the other.

We have read about the civil war in Georgia as reported in the press, but till now we were not aware of the total disruption of the communication system in that country. We consider it our privilege to publish this scientific paper smuggled out of Tbilisi, the beleagured capital of Georgia and sent to us for pubiication through a distinguished academician of Moscow.

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Amphibian communities of the Southern Viet Nam : Preliminary data

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Abstract :

Investigations on amphibian communities of the two localities of the Southern Viet Nam were prepared during August-November, 1990. 22 anuran species were established from researched localities. Information on external morphology of species, their breeding ecology, larval development and on their main habitats are given. Composition of species in terrestrial localities and in breeding sites (adults and larvae) was studied. Niche structure of amphibian communities is discussed.

Introduction :

There are not many publications dedicated to amphibian fauna of Indo-China. Classic monograph of Bourret (1942) and Taylor's (1962) monograph on the Thailand amphibians must be mentioned in this regard. In the catalogue of Vietnamese amphibians (Dao Van Tien, 1977) species list of Bourret 12 recently discovered species are added. According to this catalogue, 87 amphibian species inhabit Viet Nam, including 83 anurans. 94 Anuran species were established for Thailand by Taylor (1962). Synonyms of specific names and weakly elaborated systematics on the species and genera levels make difficult the correct comparison of Taylor's and Dao Van Tien's lists. Perhaps the common species prevail and almost all genera are common. The main part of Indo-Chinese amphibians are distributed only in mountains, at the north of the peninsula. Judging from special articles, species number in separate localities never exceeds10—15. Special investigations of Southern Viet Nam amphibian fauna are extremely sparse. In the article of Nguyen Van Sang & Ho Thu Cuc (1979) 11

amphibian species are noted for south-western Viet Nam : *Bufo melanostictus, Rana rugulosa, R. limnocharis, R. kuhli, R. macrognathus, R. guentheri, R. taipehensis, Occidozyga laevis. Polypedates leucomistax, Kalophrynus pleoros tigma, Microhyla heymonsi* (specific names are brought into account with the Dictionary of Animal Names in Five Languages (Ananyeva et al , 1988). 5 species of *Microhyla* (besides *M. heymonsi*) are noted in the key of amphibian larvae of lowland Southern Viet Nam (Smirnov & Ho Thu Cuc,— 1982) : *M. butleri, M inornata, M. palmipes, M.* sp. 1, *M.* sp. 2 (presumably, *M. annamensis* and *M. picta*). Another 6 species are noted in articles, dedicated to amphibian fauna of Tao Nguyen mountain plateau (Ho Thu Cuc & Smirnov, 1983 ; Smirnov & Ho Thu Cuc, 1983) : *Microhyla pulchra, Rhacophorus nigropalmatus, R notater, R. pardalis, R. schlegeli, Theloderma bicolor.* In this area, *Microhyla berdmorei* is also common species (S. Smirnov, personal communication). In the town Nha Trang (seashore) *Kaloula pulchra* was noted (B. F. Goncharov, personal communication). Thus, 25 Anuran species could be established for southern Viet Nam. Many of them are widely distributed and noted also for fauna of Thailand (Taylor, 1962) and Southern China (Chang & Hsu, 1932). *Bufo melanostictus, Rana limnocharis, R. guentheri, Polypedates leucomistax, Microhyla pulchra* and *Rhacophorus pardalis* have especially wide ranges in southern and eastern Asia. Perhaps all these species are distributed both in lowlands and mountain areas. Endems of Southern Viet Nam are absent among 25 enumerated species (probably except undistinguished species of *Microhyla*).

I investigated species composition and ecology of amphibians since August, 11 to November, 2 1990 in two regions of Southern Viet Nam : 1. Ho Chi Minh (Saigon) City and the forest Ma Da, distant of about 150 km in the north-western direction from the city ; 2. town Nha Trang on the seashore and mountain artificial lake Da Ban, situated in about 60 km in the north-western direction from the town.

Following amphibian species (adults, larvae or both) were established in the forest Ma Da and its surroundings.

Fam. Bufonidae. 1. *Bufo melanostictus.*

Fam. Ranidae. 2. *Rana (feuervaria) limnocharis ;* 3. *R. (euplictis) rugulosa ;* 4. *R (hylarana) taipehensis ;* 5. *Occidozyga laevis ;* 6. *O. lima.*

Fam. Rhacophoridae. 7. *Polypedates leucomistax ;* 8. *Chirixalus nongkhorensis ;* 9. *Ch. hansenae ;* 10. *Rhacophorus pardalis ;* 11. *Rh. af. nigropalmatus :* 12. *Theloderma stellatum.*

Fam. Microhylidae. 13. *Microhyla pulchra ;* 14. *M. ornata* ; 15. *M. heymonsi ;* 16. *M. butleri ;* 17. *M. palmipes ;* 18. *Microhyla* species ; 19. *Kalophrynus pleurostigma.*

In the surroundings of artificial lake Da Ban following amphibians were found besides these species : 20. *Rana (hylarana)* af. *latauchi*—only one recently metamorphosed ; 21. *Rhacophorus* sp.—a few tadpoles in the creek of the small river. In the island Thanh Da and Thu D'uc ponds Saigon, *Rana (hylarana) erythraea* was found (22).

Absence of *Rhacophorus* aff. *nigropalmatus, Rana erythraea* and *Kalophrynus pleurostigma* in samples obtained from the second region is connected perhaps with the short period of research : these species are widely distributed.

Theloderma stellatum, Chirixalus hansenae and *Rana latouchi* were not found in Viet Nam by previous researchers. The status of *Rhacophorus* sp. (only tadpoles were found) is unclear. One of the *Microhyla* species is absent in bibliography looked over. Probably it is the new species.

Thus, at least 26 anuran species could be exactly established for amphibian fauna of Southern Viet Nam (lumping together bibliography and data presented here). The 2 doubted species are *Microhyla* sp. 1 and *M.* sp. 2 of Smirnov & Ho Thu Cuc (1982). Perhaps *Rhacophorus sp., Rh. notater, Rh. schlegeli* and *M berdmorei* are distributed only in mountains ; *Chirixalus hansenae, Kalophrynus pleurostigma, Microhyla* species and *Kaloula pulchra*—only in lowlands. In general, species diversity of *Rhacophorus* is higher in mountains, species diversity of *Microhyla*—in lowlands.

Material and Methods :

All the work was elaborated on the base of Academy of Sci. USSR and Viet Nam Acad. Sci. Tropical Center.

Surroundings of the station Ma Da (MD) were investigated from 09.10 to 02.11, at the end of the rainy season and during 7 field excursions in the second half of August. MD is situated on the lowland area, in the north-west of the province Dong Nai. Secondary forest predominates. Very small patches of the primary dipterocarpous forest (each less than 1 hectare) remain in a few places. Most of amphibian species breed in rain pools situated on the country roads during the season of rains. Volume of pools varies from some litres to some thousand litres.

Depth from 3—5 to 20—40 cm. In most of the pools water vegetation is sparse or absent ; water is turbid ; light 50% at least ; bottom is covered with silt. Some pools are situated in forest shadow. Water here is transparent, bottom is covered with detritus. Open agricultural lands (rice fields etc) are adjacent with woodland areas. Before the study, the area was divided in plots (see Fig. 1).

Surroundings of the artificial lake Da Ban (DB) were studied during the short-term expedition (7—11 September), at the begining of the rainy season. Primary mountain forest predominates, though the elevation doesn't exceed 100—200 m. Two different types of localities could be picked out in DB : temporary streams in the open areas of the eastern lake shore and the river bed in the wooded north-western part (Fig. 2). Three groups of breeding sites could be outlined in the first locality. Group A : small, slowly running creeks of 20—40 cm depth ; water is quite transparent, vegetation sparse. Fishes inhabit some of them. Group B : water collected in bulldozer holes. Water is turbid, vegetation absent, depth from 40 to 80 cm. Group C : wells with clear, transparent water, dense water vegetation, depth of 60—100 cm. The second locality (river bed) includes small, slowly running, running and stagnant pools, formed by the rocky river bed (width of the bed 20—30 m). River creeks are used also as the breeding sites here. Water is always transparent, water vegetation sparse, thick layer of fallen leaves covers the bottom. Reservoires are situated jn shadow.

River Be (surroundings of the town Nha Trang ; RB) was inspected in 19.09. It is the small slowly running river with dense vegetation, situated in bushy and agricultural areas ; a lot of stagnant pools lay along the river shore.

Small reservoirs in Ho chi Minh City (rain pools, the eutrophicated pond, fish-rearing basins ; HC) were investigated in August and at the end of September ; puddles in the town Nha Trang—in the mid-September.

Collected animals were elaborated morphometrically according to Ishchenko's (1978) scheme. Following measurements were taken : 1. body length (L) ; 2. head length (Lc) ; 3. maximal head width (l.t. c) ; 4. length of the snout (D. r. o) ; 5. distance between fore angles of eyes (Sp. oc) ; 6. eye length (Lo) ; 7. tympanum length (L. tym) ; 8. hip length (F) ; 9. shin length (T) ; 10. length of the first right toe (D. p) ; length of the outer inner metacarpal tubercle (c. int)—(Fig. 3). The percent of specimens with light mid-dorsal stripe was registered in species in which this character occurs. Developmental stages of larvae were established according to Gosner's (1960) tables. For diagnosis of larvae, keys of Smirnov & Ho Thu Cuc

(1982) and Ho Thu Cuc & Smirnov (1983) were used. In other cases, larvae were reared to metamorphosis and specification have be done on the emerged froglets. Collecting samples of larvae, pools were intensively treated by dip net and samples of necessary size were selected randomly. Adult frogs were collected during the light time or night excursions. Larvae, offsprings and small frogs *(Microhyla* and *Chirixalus)* were measured using a binocular-micrometer with eyepiece, to an accuracy of 0.1 mm ; larger specimens were measured with calipers to the same accuracy. Standard statistical methods (Zaitsev, 1983) were used in calculations.

Observations :

Descriptions of separate species.

family Bufonidae.

Bufo melanostictus Schneider—Asian common toad

*Short description of external morphology**. Toad of intermediate size. ♂ : L=63.5—74.2 mm ; L/Lc=3.21—3.29 ; Lt.c/L=0.40—0.41 ; Sp.oc/D.r.o=1.10—1.13; Lo/Ltym=1.41—1.68; F/T=0.93—1.08 ; n=2. ♀ : L=74.9—98.7 mm (x=87.77); ♀ L/Lc=3.31—3.74(3.56) ; Lt c/L=0.37—0.42(0.39) ; Sp.oc/D.r.o=0.95—1.11(1.04) ; L/Ltym=1.07—1.57(1.41) ; F/T=0.95—1.07(1.02) ; n=6. (Fig. 4, App. 1). Coloration from light brown to dark brown. Sometimes reddish pattern on the light-brown skin occurs. Parotid glands darker than ground colour. Inner edges of eyelid and outer edges of snout are bordered with keratinized crest, black on the top. The first inner finger longer than the second one. Toes about one-third webbed. Male has weakly developed sexual tubercles on the first finger. Mating call could be defined as a short peep. Eggs are deposited in a long string. Tadpoles begin to feed (stage 25) by snout-vent length (SVL) of 3.1 mm and metamorphose by SVL of 8.5—9 mm (Fig. 4). Tadpoles of "bottom" type ; mouth directed ventrally. Mouth parts on the Gosner stage, 30 : upper rows of keratinized denticles (URD)—2 ; lower rows of denticles (LRD)—3 ; all rows continual ; The first LRD curved upwards ; beak thin, upper part of beak (UB) bow-shaped, lower part (LB) forms the angle. Body flattened dorso-ventrally, black-coloured. L of offsprings just after metamorphosis 6.5—8 mm.

Distribution : Widely distributed in Indo-China, Southern China, Burma, Northern India, Tibet and the Indo-Australian Archipelago (Taylor, 1962) Adult toads were found in HC, RB, DB. Tadpoles and toadlets in DB, RB, MD.

* Here are given only a rough descriptions of adult morphology of the most of the species : detailed morphological descriptions are given in well-known monographs (e. g. Bouuret, 1942 ; Taylor, 1962).

Ecology : Adults could be found in almost all types of landscapes: from urbanized ecosystems to primary forest. Nevertheless they were not found in wooded areas of MD, perhaps as a result of shelter's shortage necessary for this large terrestrial species of toad. Activity nocturnal, spawns in water bodies of different sizes, requires clear, slowly running water, (seepage pools to rivers with slow currents and shallow sandbanks). Tadpoles prefer shallow places, commonly crowd in large aggregations. Larvae of developmental stages 26—30 were collected in 3 pools of MD, in October 20—25. In the first locality of DB, tadpoles of stages 25—44 were collected in September 7—11. All larvae are on the similar developmental stages in one water body. Tadpoles of stages 25—44 were found in RB, September, 19 ; but the stages 26—30 (SVL 3.1—8.0 mm) predominated. Thus, breeding period is prolonged : newly hatched larvae as well as offsprings were found both at the beginning of the rainy season (DB). and at the end of rains (MD). Heyer (1973) mentioned that the highest reproductive activity takes place at the beginning of rain season. Larval period covers less than 1 month.

family Ranidae.

Rana feuervaria limnocharis Gravenhorst—rice frog

Short description. Frog of intermediate size. ♂ : L=34.7—42.3mm(x=38.51) ; L/Lc=2.55—3.33(2.88) ; Lt.c/L=0 31—0.37(0.34) ; Sp.oc/D.r.o=0.79—0.93(0.85) ; Lo/Ltym=1.22—1.77(1.52) ; F/T=0,73—0.90(0.83) ; n=16 ♀ : L=44.3—55.2 mm (51.04) ; L/Lc=2.91—3.56(3.16) ; Lt.c/L=0.32—0 36(0.33) ; Sp.oc/D.r.o.=0.82—0.90 (0.87) ; Lo/Ltym=1.13—1.50(1.33) ; F/T=0 75—0 95(0.87) ; n=7 (Fig. 5, app. 1) Snount slightly oblong. Upper jaw projected foreward. Colour varies from olive brown to light green with the special kind of dark, W-like transversal pattern. Skin is covered with symmetrical oblong tubercles. Light (white or reddish), very clear mid-dorsal stripe presents frequently (phenotype Striata, S). The first inner finger is longer than the second one. Hind-limbs relatively short : tibiotarsal joint of leg stretched forward along the body axis does not reach frontal edge of eye. 4th toe fully webbed. Adult male has weakly developed mating tubercles and pair of a large black spots on the throat. Mating call forms the complex combination of squeaking and croaking voices. Grey-coloured eggs are deposited as a clutch freely drifting on the water surface. Diameter of an egg without jelly capsule 1.3—1.5 mm. One clutch includes 150—1000 eggs (427±54, n=18). Larvae are bottom-feeders, dark coloured, covered with irregular spots ; the end of caudal fin black. Body length of larvae just after the active feeding have begun (Gosner stage 25) 2.7—3.0 mm, the maximal body length to 15 mm. Mouth parts on the Gosner stage, 30 : URD—2 ;

LRD—3 ; both the 1st URD and the 1st LRD are divided in the middle part. UB curved like yoke ; LB forms the sharp angle. Body length of offsprings just after metamorphosis 11—15 mm, depending on the size of pool in which tadpoles develop.

Polymorphism. 18 from 35 observed adults and subadults had a light mid-dorsal stripe (S). Nevertheless, only 9 from 66 observed offsprings had the clear stripe (14%) and 2 of them had weakly developed stripe (PS). There were no striped froglets in DB. The reason of such differences among adults and juveniles in phenotype ratio is unclear. Phenotype S couldn't appear during the post-metamorphic development. This character has well-known hereditary nature (Ishchenko, 1978), though frequency of striped frogs could be changed under the developmental conditions of larvae (Tarkhnishvili & Mamradze, 1989). The high selective value of the character could be proposed, but regular appearance of unstriped froglets in the populations depreciates this supposition.

Distribution. Widely distributed in Indo-China, India, Ceylon, China, Japan, Indo-Australian archipelago (Taylor, 1962). Both adult frogs and tadpoles were found in all inspected places.

Ecology. Frogs could be met in all landscape types : from cities to primary forests. Permanently and during all stages of their life cycle, frogs are strictly attached to v ater, but commonly escape danger in bushes and other shelters on the surface. Active frogs could be seen during the period of light ; nevertheless, some frogs spend a day in shelters : under the logs, boards etc., usually not far from water. Spawning in stagnant rain pools in all landscape types, independently of the pool size, transparency and presence of the water vegetation. Larvae keep on the bottom but never form large crowds, differently from toad tadpoles Amplexing couples could be seen in evenings near the pools, on the surface.

Larvae of the stages 27—29 (7.6—10.4mm) predominated in MD in August. During October, all the larval stages until metamorphosis, as well as eggs, occurred. Stage composition varied among different pools. Larvae of all developmental stages (2.7—13.5 mm) were observed in water bodies of DB eastern shore. According to Heyer (1973), this species can to bred both at the beginning and at the end of the rainy season, but information on breeding is more fragmentary than in most anuran species. This accords to my observations : a lot of larvae could be seen at the beginning (DB) as well as at the end (MD) of rainy season, but during the middle rainy season (MD, August) larvae were sparse and spawn was absent. Follicles

of different size were registrated in ovary of mature females. Perhaps each female breeds two or more times during one breeding season, as at the north of the species range, in Japan (Shichi et al., 1988). Developed oocytes occurred in ovary of all mature females, independently of the place and time of catch. Recently deposited egg clumps appeared in MD until October, 26 ; even some intensification of spawning took place during October, 20—25 (in MD, rains stop at the beginning of November). Mating calls could be heard until the end of October.

Rana (euplictis) rugulosa Wiegmann—Chinese bullfrog.

Short description. Large frog. ♂ : L=87.9 ; L/Lc=3.14 ; Lt.c/L=0.37 ; Sp. oc/D.r.o.=0 78 ; Lo/Ltym=1.06 ; F/T=0.94 ; n=1. ♀ : L=66.8 ; L/Lc=2 87 ; Sp.oc./D.r.o.=0.39 ; Lo/Ltym=0.74 ; F/T=1.11 ; n=1 (Fig.6,app.1). Snout slightly oblong, upper jaw projected forward. Coloration greyish-white, with greenish-brown pattern. Coloration pattern is similar to rice frog's, but not so bright. Skin is covered with oblong tubercles. Phenotype *striata* never present. The first finger longer than the second one. Hindlimbs relatively short : tibiotarsal joint never reach frontal edge of the eye. 4th toe fully webbed. Male has weakly developed mating tubercles. Males and females almost of equal size. Mating call : muffled croaks. I never have seen spawn of this species. Body length of larvae just after hatch about 3 mm ; maximal body length exceeds 20 mm. Larvae of bottom type. Mouth directed ventrally. Mouth parts of larvae on the Gosner stage, 30 : URD—2, LRD—3. All rows continual. UB thick, with 1 sharp cog in the middle part ; LB thick, with 2 cogs. Body is roller-shaped, weakly-pigmented, eyes instantly displaced on the dorsal side. Deep costal grooves present. Body length just after metamorphosis 21—34 mm (Table 1).

Distribution. Widely distributed in Indo-China and southern China (Bourret, 1942). Frogs were found in all inspected places where comparatively large pools and ponds were present (MD, DB, NT, HC).

Ecology. Agrocenoses, banks of ponds and lakes, light forest. These frogs are permanently attached to water, prefering comparatively large water bodies. Breeds in stagnant pools and ponds of 1001 and more. In larvae, crowding behaviour absent.

Large tadpoles of stages 38—39 predominated in August (MD) though separate newly hatched tadpoles also occurred (7.0—18.2mm). In October, only one larva of stage 39 was collected. In DB, larvae of stages 24—40 (3.0—19.4 mm) were collected in 3 breeding reservoirs and predominated

in 2 of them. Crying males were seen on the shore of DB. Follicles of different size occurred in ovary of adult females : perhaps spawning is partial. At the end of rainy season reproductive activity decreases. It might be connected with long (more than 1 month) larval period and large size of larvae. Breeding is less successful at the end of rainy season. The main limiting factor must be presence of large, stagnant reservoirs. According to Smirnov & Ho Thu Cuc (1983), negative influence of *Polypedates leucomistax* nests on the Chinese bullfrog larvae is possible.

Rana (hylarana) taipehensis Van Denburgh—striped slender frog

Short description. Small frog. ♂ : L=28 0—31.4 mm (29.63); L/Lc=2.45—3 04(2 67); Lt.c/L=0.27—0.31(0.29); Sp.oc/D.r.o.=0.62—0.98(0.85); Lo/Ltym=0 71—1.11(0 85); F/T=0.76—0.96(0.85); n=15. ♀ : L=38.9—42.9 mm (40.75); L/Lc=2.70—3.02(2.86); Lt.c/L=0 27—0.29(0.28) ; Sp.oc/D.r.o.=0.79—0.90(0.85) ; Lo/Ltym=0.89—1.17 (1.06) ; F/T=0.80—0.92 0.84); n=4 (Fig. 7, app. 1). Body slender, hindlimbs long, snout thin and oblong. Coloration from light-green to brown with dark specks. The pair of dark stripes, edges with black. 3 from 19 frogs collected from DB had narrow light mid-dorsal stripe. Skin smooth. The first finger is slightly longer than the second one. Tibiotarsal joint reaches tip of snout. 4th toe fully webbed Mating tubercles absent. Mating call : a low twitter. Larvae hatch at the body length of 3.5 mm and reach maximal size more than 19 mm. Larvae of phitiphilous type. Mouth directed downwards. Mouth parts (stage 35) : URD—1 ; LRD—2. 1st LRD divided in two parts. Both UB and LB well-developed, inner surfaces of UB and LB are covered with some scores of denticles. Mouthparts deeply immersed in epidermal tissue. The pair of dark stripes edge the body of larva. Metamorphosis is passed at the body length of 14—19 mm.

Distribution. The species distributed in Vietnam and Southern China (Chang & Hsu, 1932). I collected these frogs on the eastern side of DB and (one offspring) near the village Rang Rang (grasslands adjuscent with MD).

Ecology. The species could be numerous in open areas with high moisture of surface (flood plains). Activity nocturnal, but separate active frogs could be seen during the period of light. Breeds in stagnant or slowly running ponds with the dense water vegetation. Larvae are strictly attached to water plants. Keep separately. Amplexing couples were found on the ground surface, in 1—2 m from the water edge.

Only one just metamorphosed specimen was found at the end of October (MD). Larvae of all developmental stages (4.0—14.1 mm) were found

in pools of DB, stages 25—30 (7.0—11.5 mm) predominated. 186 and 466 developed follicles occurred in ovaries of two prepared females (diam, 1.1—1.4 mm, x=1.23, S=0.08 and 1.3—1.6, x=1.44, S=0.10). Perhaps each female breeds once during the season,

Rana (hylarana) erythraea Schlegel—golden-lined frog.

Short description Comparatively large frog (L to 75—80 mm). Observed animals had brown (not red) spots on the lateral sides of the head. Body proportions are similar to the previous species. Coloration from lemon-yellow to greenish, skin smooth, two light stripes pass along the back Females larger than males. Tadpole looks like tadpole of *R. taipehensis* Two adult females were observed in the island Thanh Da and ponds of Thu Duc (HC). One tadpole was collected in slowly running canal of Thu Duc.

Ecology. In the island Thanh Da lives in the large pond with dense vegetation. Active during the period of light. Relatively numerous. The larva was found in stems of water vegetation, in August.

Rana (hylarana) species.

One recently metamorphosed specimen was found in the pool of B-group (DB). Coloration uniformly brown. Probably it is *R. (h) latouchi.* Well-developed finger discs. Measurements : L=14.6 mm ; L/Lc=2.52 ; Lt c/L=0.36 ; Sp.oc/D.r.o.=1.36 ; Lo/Ltym=1.94 ; F/T=1.22.

Occidozyga lima Gravenhorst—rough-skinned floating frog

Short description. A small frog. ♂ : L=18.7—25.5 mm (20.98) ; L/Lc=2 59—3.16(2.88) ; Lt.c/L=0.31—0.42 (0.36) Sp.oc/D.r.o,=0.94—1.67 (1.19); Lo/Ltym=0.91—2.70 (1.48); F/T=0.74—0.97 (0.88) ; n=11. ♀ ; L=26.9—34.5 mm (31.28); L/Lc=3.00—3.85 (3.44) ; Lt.c/L=0 29—0.38 (0.34) Sp.oc/D.r.o.=0.63—1.60 (1.03) ; Lo/Ltym=1.00—1.72 (1.30) ; F/T=0.74—0.99 (0.84) ; n=9 (Fig. 8, app. 1). Legs relatively short, laying almost on the horizontal plane (Fig. 8). Toe tips keratinized and sharpened ; toes fully webbed. The first finger longer than the second one. Eyes displaced on the dorsal side. Vomerine teeth well-expressed. Tongue sharpened. Skin granulated. Coloration pattern very variable : uniformly grey or dirtily-white with greenish pattern of variable shape. Wide, unclear light stripe or clear, narrow, yellow or green mid-dorsal stripe present sometimes. Mating call : low clicking voice, in some sense resemble the voice of motor damping down. Tadpoles are known as phitophilous carnivores (Heyer. 1973). Mouth parts : keratinized denticles absent. Beak small, but strong. Teeth absent. Beak deeply sunken in

soft tissues. Body slender, light with the pair of dark stripes ; snout protected foreward. Maximal body length of tadpoles about 12 mm. Offsprings emerge at the body length of 10—12 mm.

Distribution. The species widely distributed in Indo-China, Burma, Southern China, in some islands of Indo-Australian archipelago. Both adults and larvae were found in all investigated localities.

Ecology. Life mode aquatic. Commonly can be seen floating on the water surface. Prefers stagnant pools (but of volume 1001 and more), situated in open areas. *O. lima* absent in forested areas (it has not been found in the forest of MD, but is usual in adjusted grasslands). On the ground surface, moves very clumsy, because of morphology of hindlimbs ; but easier than the African clawned frogs (g. *Xenopus*). These frogs are active both during the dark and light hours, but reproductive activity nocturnal. Amplexing couples were found at night in water (DB) Tadpoles develop in water bodies with dense water vegetation, often in slowly running pools and gutters. They are syntopic with tadpoles of *Rana (hylarana)* spp.

Some hundreds of various-sized follicles (0.6—1.1 mm, x=0 8) were found in ovaries of females from DB. Spawning must be portional. Tadpoles collected in the same place were at the developmental stages 25—45 (L=6—12 mm). One larva found in MD was at the stage 26, larva from HC—at the stage 39. Only a few larvae could be seen in one pool : perhaps small portions of spawn are deposited during one spawning. According to Heyer (1973a) spawning covers all the rainy season, but is not uniformely distributed in time.

Occidozyga laevis Gunther—Indo-Malayan floating frog.

Short description. Small frog. ♂ : L=17.0—22.1 mm (20.28) ; L/Lc=2.54—3.16 (2.82) ; Lt.c/L=0.35—0.43 (0.38) ; Sp.oc/D.r.o=1.19—1.91 (1.46) ; Lo/Ltym=1.47—2.09 (1.77) ; F/T=0.71—1.00 (0.81) ; n=8. ♀ : L=23.0—28.9 mm 25.8) ; L/Lc=2.91—3.4 (3.19) ; Lt.c/L=0.35—0.43 (0.37) ; Sp.Oc/D.r.o=1.33—1.56 (1.44) ; Lo/Ltym=1.50—1.75 (1.60) ; F/T=0 62—0.94 (0.76) ; n=5 (Fig. 9. app. 1). Toes fully webbed. Length of the first finger equal or slightly longer than the second one. Vomerine teeth absent. Tongue rounded. Skin almost smooth, with small tubercles. Coloration grey of light brown with broad brick-red, unclear stripe. Stripe is the most bright in its fore-part. Specimens with clear, light, narrow middorsal stripe could be found among recently metamorphosed frogs. According to the description of Ho Thu Cuc and Smirnov (1983),

tadpoles are morphologically similar to rough-skinned floating frogs. Collected offsprings had body length of 8—12 mm.

Polymorphism. More than 100 adults and subadults were looked over; more than 50 from MD. No one frog with phenotype S appeared among them. None the less, 4 offsprings from the 29 collected in MD had clear mid-dorsal stripe. In difference from rice frog, among *O. laevis* frequency of S instantly decreases after metamorphosis. The reason of opposite direction of S selection for these 2 species remains unclear.

Distribution. Southern part of Thailand, Southern Vietnam, Malaysia (Taylor, 1962). Adults were found in all inspected localities, offsprings—in forest areas of MD and DB.

Ecology. Inhabits all landscape types, from agricultural lands to primary forests. Everywhere dominant, numerous species. Activity through all the day and night. Permanently attached to the water line of small pools and streams. In danger, conceals in water. One amplexing couple was observed on the eastern shore of DB, 1 m from the water line.

30—123 (x=93.6) follicles (diam. 0.9—1.4 mm, x=1.2) were counted in ovaries of 5 mature females from DB. All females collected in MD also had developed follicles. I never have seen larvae, but offsprings were numerous everywhere. The highest density of this species (both juveniles and adults) was observed in MD, October 15—25. According to Heyer (1973), reproductive activity of this species is almost uniformly distributed through a season of rains.

Family Rhacophoridae.

Polypedates leucomistax Gravenhorst—Malayan tree frog.

Short description. Large arboreal frog. ♂ : L=46.8—60.6 mm (54.67); L/Lc=2.74—3 34 (2.96); Lt.c/L=0.31—0.35 (0.33); Sp.oc/D.r.o=1.05—1.17 (1.10) : Lo/Ltym=1 20—1.75 (1.39); F/T=0.84—1.05 (0.94); n=28 ♀ : L=77 3—89.0 mm (83.43); L/Lc=3.16—3.33 (3.24); Lt.c/L=0.32—0.35 (0.34); Sp.oc/D.r.o=1.19—1.21 (1.20); Lo/Ltym=1.07—1.43 (1.25); F/T=0.87—0.96 (0.91); n=3 (Fig. 10, app. 1). Broad digital disks present. Body oblong. Coloration normally light brown (but darkens on the dark substrate and in cold). Middle-brown pattern appears on the light ground coloration. The pattern is variable; an open triangle, a few parallel stripes, sometimes specks etc. (Fig. 10). Females instantly larger than males. Males have well-developed mating tubercles on the first finger. Mating call : separate, deep croaks. Eggs

poorly pigmented, 1.6—2.0 mm diam. Spawns in large foamy nests near the water line on the ground surface, sometimes attaches nests with grass or bush branches abcve the water. At the moment of spawning, nest is pinkish, a few hours later becomes greenish. There are 120—376 eggs ($x=258.4$. $n=8$) in one nest. Larvae hatch with body length 4 0 mm and reah maximal size of 17.4 mm. They are of mixed type (not c'ear bottom type nor swimming type). Keratinous beak and denticles well-developed. Mouth parts on the stage 36 : URD—4, LRD—3. 1st, 2nd and 3rd URD divided in 2 parts ; 4th URD and all LRD continual. UB strong, with broadening in the central part. Papillae on the oral disk are not developed. Eyes situated laterally. Dorsal fin commonly high ; but larvae developing in large ponds have low dorsal fin and long tail with filament at the end. Coloration of larval body from whitish to dark-grey or brick-red on the lateral sides, depending on the pond type. The characteristic lightspot present between the nostrils. Metamorphosis finishes at the body length 17.0—18.5 mm.

Polymorphism. Deep interpopulation differences in body length must be considered (app. 1.) Body length of males from DB significantly exceeded body length of males from MD : $x_1 = 57.0 \pm 0.5$ ($n=17$) ; $x_2 = 49.6 \pm 0.8$ ($n=17$). Probably it is connected with a better developmental conditions of larvae in the first habitat and a larger body size of offsprings : SVL af active larvae varies in MD between 4.0—4.5, in DB—between 4 0—17.4 mm.

4 frogs from 13 collected in MD were instantly darker in the same keeping conditions than another one. In DB, the proportion of dark and light animals reaches 8 : 20. The pattern varies independently of the ground coloration. About one-half of frogs examined in both populations, had a lot of little specsk together with the main pattern. Triangle-shaped pattern is commonly reduced to a few spots. 2 frogs from DB and 1 —from MD had 3 parallel dark stripes on the back. Taylor (1962) described animals with such coloration pattern as subspecies *P. e. sexvirgatus*. Judging from presence of typical and striped frogs in the same population, *sexvirgatus* is only the morph in polymorphous populations.

Distribution. Widely distributed in Indo-China, India and Southern China, in some islands of Indo-Australian archipelago (Taylor, 1962). On the north, reaches foothills of Himalaya. It was found in all inspected places.

Ecology. Occurs in wide spectra of environmental conditions—from agrocenoses to light forests. Keeps on the low trees and bushes.

Activity nocturnal. During periods of light spends under the crust, logs, or immovably sits on the branches and bushes. Spawns in pools and small ponds, independently of the light, presence of the water vegetation and water transparency. Judging from the distribution of clutches, density is independent of the type of landscape. The most of time larvae spend swimming in the thickness of water. Amplexing couples (5 in total) were found in water as well as on the land. Amplexing frogs spend some time in water even if egg deposition occurs on the shore.

Follicles of 0 8—1.5 mm diam, occured in ovaries of mature females. Perhaps spawning is portional. Stage and size composition of larvae collected in different localities don't differ. Always and everywhere animals of different developmental stages, from eggs to offsprings, could be seen (though larvae of stages 25—30 commonly predominate). This accords to Heyer's (1973) information that reproductive period of *P. leucomistax* covers uniformly the rainy season. It must be noted that in Eastern Bengal (northern part of the species' range) reproductive period covers only about one month (Kiyasetuo & Khare, 1986).

Chirixalus nongkhorensis Cochran.

Short description. The small arboreal frog. ♂ : L=25.5—28.6 mm (26 98) ; L/Lc=3.03—3 62(3.35) ; Lt.c/L=0.30—0.33(0.32) ; Sp.oc/D.r.o=1.17—1.61(1.41) ; Lo/Ltym=1 17 - 1 69(1.41)F/T=0.88—0.99(0.94) ; n=16. ♀ : L=32.3 ; L/Lc=3.26 ; Lt.c/L=0.32 ; Sp.oc/D.r.o=1.02 ; Lo/Ltym=1.56 ; F/T=0 99 ; n=1 (Fig. 11, app 1). The size is smaller than of *Ch. nongkhorensis* from Thailand (according to Taylor, 1962, L=29—32 mm in males and 35—36 mm in females). Broad digital disks present. Body slender. Coloration light-brown. The dark pattern of various shape is slightly similar to pattern of *P. leucomistax*. Sometimes, pigmentation non-uniform and forms the marmoreal pattern (in 20 from 42 frogs examined). Sometimes appear light-yellow frogs with a light dorsolateral stripes. Well-developed mating tubercle present. Mating call : singular, short sharp and loud scream. Eggs unpigmented, diam. 1.4—1.6 mm. Eggs are deposited in small (to 5 cm diam.), pink foamy nests, attached to grass or bush branches, at the height 20 cm to 1.5 m above the water surface. 7 observed clutches included from 80 to 175 ($x=110.2\pm12.2$) eggs. Tadpoles hatch at the body length of 3 mm, after 4 days of embryonal development, and reach maximal size of about 12 mm. Tadpoles of bottom type, body grey with dark specks, eyes displaced dorso-frontally. Mouth parts at the stage : URD—3. LRD—3. All URD and the 1st LRD divided. UB broad, bow-shaped. LB forms a sharp angle. Body length just after metamorphosis 10—13 mm.

Distribution. This species was not considered for Vietnam in previous investigations (probably, it was described them as *Philautus doriae).* Distributed in southern Thailand (Taylor, 1962). I have found it in the secondary forest of MD and in the eastern shore of DB. In the former locality, this treefrog is relatively numerous.

Ecology. Inhabits bushes and light forests. Keeps on the bush branches and tall grass stems. Activity nocturnal. Spawns in stagnant pools exposed to light. The distribution is more aggregated than in *P. leucomistax ;* but in places where these two species coexist, the density of *Ch. nongkhorensis* is, higher 2.5–3.5 times. Tadpoles detr itophagous. Amplexing couples could be seen on the bush branches and grass stems sbove the pools. According to Heyer (1973), spawning occurs at any time during the rainy season, but fragmentary I have found foam nests in Ma Da both in August and in October, but the number of nests was instantly lower than in *P. leucomistax.* (7 clutches were found in all). Correspondingly, tadpole density is commonly low. All 5 collected larvae were at the developmental stages 35—42.

Chirixalus hansenae Cochran.

Short description. Very small treefrog. ♂ : L=20.7—22.5 mm (21.62) ; L/Lc=3.13—3.23 (3.19) ; Lt.c/L=0.28—0.33 (0 30) ; Sp.oc/D.r.o=1.13—1.47 (1.26) ; Lo/Ltym=2.31 - 2.86 (2.50 ; F/T=0.87—1.08 (0.99) ; n=4. ♀ : L=24.4 ; L/Lc=3.39 ; Lt.c/L=0.29 ; Sp.oc/D.r.o=1.49 ; Lo/Ltym=2.42 ; F/T=0.98 ; n=1 (Fig. 12, app. 1). Body slender : more slender than in previous species. Diameter of the largest digital disk larger than tympanum. Coloration : lemon-yellow with very unclear dark stripes along the back. Aggregations of melanophores forming coloration pattern are well distinguishable. The first finger shorter than the second one. Mating call short and sharp but not so loud as in previous species. Perhaps deposits spawn in foamy nests.

Distribution. This species was not known from Vietnam. Distributed in southern Thailand (Taylor, 1962). We collected *Ch. hansenae* specimens in Md, near the station of the Tropical Center.

Ecology. Sporadically distributed. The density low : Only one amplexing couple was found on the grass stem. Activity strictly nocturnal.

Theloderma stellatum Taylor.

Short description. Small tree frog. ♂ : L=24.6—33.3 (28.08) ; L/Lc=2.18—2.66 (2.53) ; Lt.c/L=0.41—0.43 (0.42) ; Sp.oc/D.r.o =1.06—1.45 (1.18) ; Lo/Ltym=1.12—1.48 (1.33) ; F/T=0.89—1.01 (0.93) ; n=5 (Fig. 13, app. 1). Probably this

species was described by Smirnov and Ho Thu Cuc (1983) as *Rhacophorus leporosus bicolor*. *T. stellatum* differs from *Theloderma bicolor* by breeding in tree holes, absence of vomerine teeth and smooth throat and chin. Skin rough, grainy. The combination of grey, black and cream colours forms the characteristic crown-like pattern. Belly black, sometimes black-reddish, with cream or white web (black-marbled). Fingers webbed in one-quarter. Males have a large and well expressed mating tubercles. Eggs dark-brown, of 2.2—2.5 mm diam. Embryonal development covers 4—5 days. Tadpoles begin to feed at the body length of 4.5—5 mm and reach the maximal body length of 19 mm. They have dark-brown body flattened dorso-ventrally; eyes instantly displaced on the dorsal side. Mouth parts on the stage 37 : URD—4 ; LRD—3 ; Beak strong, sunken in soft tissues. Mouth papillae well developed. Body length of offsprings just after metamorphosis 17—19 mm.

Distribution. Taylor (1962) found and described this species from Khao Sebab, Thailand. In the MD forest, *T. stellatum* is a common (but not numerous) species.

Ecology. In MD, prefers the plots of primary forest but larvae could be seen even in stump-holes on the clearings. Spawn is deposited in small clumps (2 to 5 eggs in each), attached to the upper inner surface of treeholes and notches on the dipterocarp stems, in 5—10 cm above the surface of rain water collected in holes. Larvae develop in treeholes and notches. According to Smirnov and Ho Thu Cuc (1983) both detritus and animal tissues were found in the guts of "*R. leporosus*" tadpoles During October, 11—14 egg clumps or larvae were found in 11 from 31 observed notches where rain water occurred : 1—10 eggs or larvae in one notch ($x=3.8\pm0.5$). Holes with tadpoles present on the plots E5, F4, F5, C5, C7, C8 (Fig. 2). Offsprings and young males could be seen often during hours of light in treeholes, sometimes together with tadpoles. One adult male was on the ground, under the log. Activity nocturnal.

Egg clumps and larvae of different developmental stages could be seen both in August and in October. Large larvae (15 - 19 mm) always predominated. Nevertheless in October the percent of notches populated by larvae decreases. Breeding prolongs to the end of rain season. At the end of October, all larvae emerge.

Rhacophorus pardalis Gunther.

Only eggs, larvae and offsprings of this species were collected, in spite of registered mating call. Newly emerged offsprings of length 14.16 mm, grey,

with large dark spots (Fig. 14). Toes one-third webbed. Mating call complex, in some sense similar to cackle. Eggs are deposited in large foamy nests, attached to tree branches, from 1.5—2 m to 10—20 m above the surface of small pools in forest. Clutch includes 200—500 eggs. Tadpoles of bottom type ; body dark. Larvae begin to feed at the body length of 4.0—4.2 mm and reach the maximal body length of 14 mm. Mouth parts on the stage 38 : URD-5, LRD-3. UB curved upwards, LB forms sharp angle. Often develop together with tadpoles of rice frog, differing from them by wide, obtuse snout.

Distribution. Widely distributed in South-Eastern Asia. Eggs and larvae of early developmental stages were found in and above rocky pools in the western side of DB ; larvae of later developmental stages—in MD forest.

Ecology. The species is not numerous. Strictly attached to forest. Activity nocturnal. Larvae develop in small and stagnant seepage, and shadowed pools with transparent water. It can develop even in very small (2—31) seepage pools. Foamy nests and larvae of stages 25—30 (4.2—10.3 mm) were found in DB in September. In MD, larvae of all developmental stages (6.0—14.0 mm) present during August-October. Males cry to the end of October.

Rhacophorus aff. nigropalmatus Liu & Hu.

Only one treefrog could be seen in MD at night, on the tree, at the height of 4—5 m. In difference from previous species, body is uniformely coloured.

Rhacophorus species,

2 Tadpoles (Fig. 15) were collected in September, 10 on the western shore of DB, in the slowly running river, on the bottom in fallen leave's aggregation, at the depth of Im. 2 other tadpoles were also found in leaves, at the depth of 30 cm. Both localities are in shadowed places. Tadpoles were at the developmental stages 25—26. Body length : 6.8, 7.0, 7.4 and 8.1 mm. Mouth parts (stage 32) : URD—2, LRD—3. Beak yoke-shaped. Tadpoles of bottom type, grey with marbled pattern.

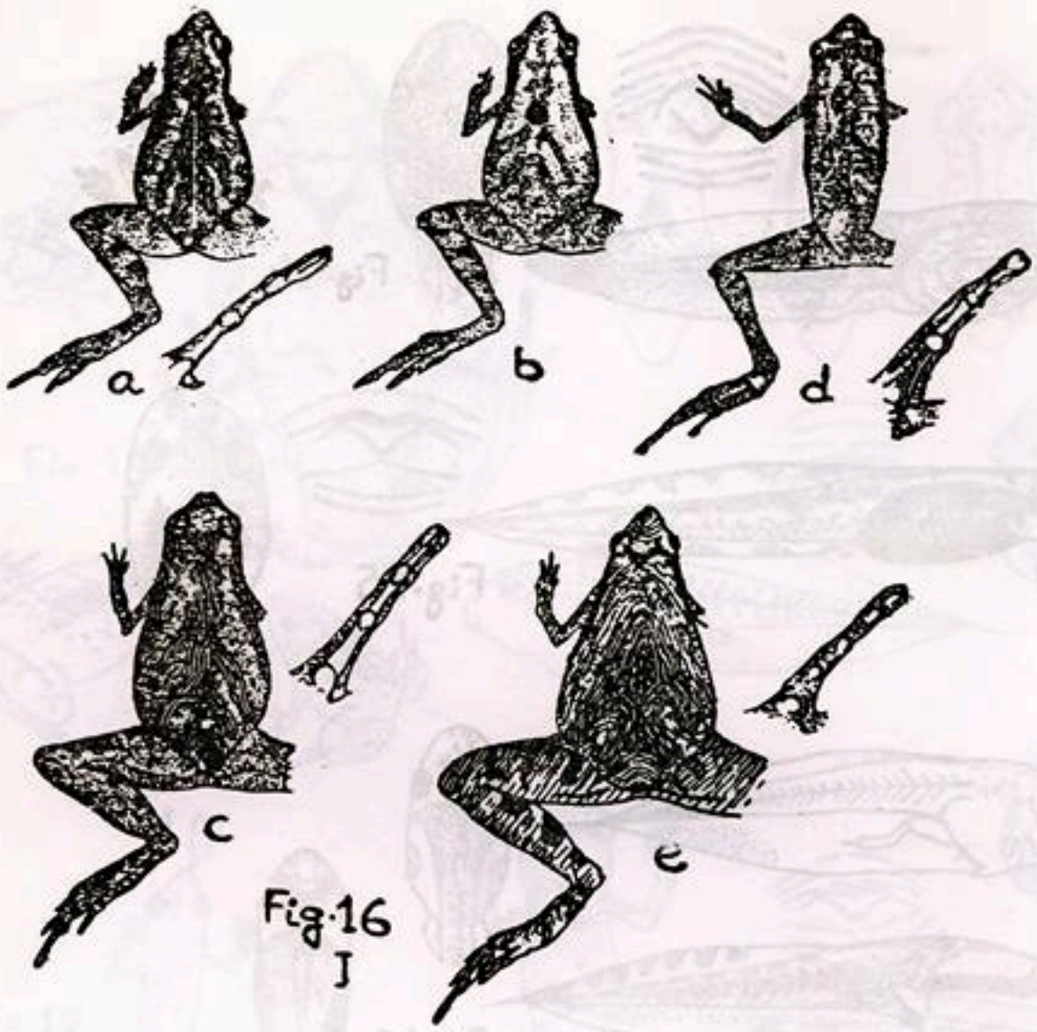
Family Microhylidae.

Microhyla ornata Dumeril et Bibron—ornate narrow-head frog.

Microhyla heymonsi Vost—Heymons' pigmy frog.

Short description. M. ornata: small frog. ♂ : L=17.9—21.3 (19.59) ; L/Lc=2.39—3.33 (2.97) ; Lt.c/L=0.31—0.42 (0.38) ; Sp.oc/D.r.o=1.25—1.46 (1.37) ; Lo/Ltym=1.70—3 33 (2.50) ; F/T=0.80—1.10 (0.90) ; n=7. ♀ : L=19.9—25.0 (22.04) ; L/Lc=2.86—3.77(3.29) ; Lt c/L=0.33—0.38(0.35) ; Sp.oc/D.r.o=1 38—1.59(1.49) ; Lo/Ltym=1.46—1.90 (1.68) ; F/T=0.78—0.93 (0.86) ; n=5 (Fig.15a, app. 1). Snout short and narrow. Interorbital space instantly larger than the length of the upper eyelid. Forelimbs thin, fingers unwebbed. Hindlimbs long, relatively strong. Toes with rudimentary web. Inner and outer metacarpal tubercles about equal in size. Tibiotarsal joint doesn't reach the tip of snout. SVL larger than Lo. Digital disks undeveloped. Skin covered with small tubercles situated in parallel ridges. Back brownish-grey with the specific brown pattern, formed by dark, thin concentric lines. Dark lines passing from snout tip through hips are situated laterally. Very narrow light mid-dorsal stripe present commonly. Male is slightly smaller than a female ; differs from a female by dark, almost black throat. The mating call is close sequence of clicking somewhat similar to noise of motor. *M. heymonsi* is extremely similar to previous species (Fig. 15, b). Body size, shape and proportions, sexual dimiorphism, the details of external morphology are almost the same. ♂ : L=18.4 mm ; L/Lc=3.23 ; Lt.c/L=0.37 ; Sp.oc/D.r o=1.37 ; Lo/Ltym=2 28 ; F/T=0.84 ; D.p/c.int=0.40 ; n=1. ♀ : L=24.3 mm ; L/Lc=3 80 ; Lt/L=0.33 ; Sp.oc/D.r o=1.60 ; Lo/Ltym=2 86 ; F/T=0.85 ; D.p/c. int=0.40 ; n=1. Only the difference outlined by Taylor (1962) is the presence of very small digital disks in *M. heymonsi ;* but sometimes small discs also occur in adults of *M. ornata.* Vocalisation of these species is quite similar, in spite of their breeding often in the same pool. Only a clear difference is the coloration pattern. Body surface of *M. heymonsi* is instantly lighter and the pattern (in its shape similar to the pattern of *M. ornata)* is light brown and almost invisible on the slightly lighter back. Moreover a clear, dark, round spot is situated on the central part of a *M. heymonsi's back.*

The situation with larval development of these species is rather unclear. Bourret (1942) described for *M. ornata* beakless tadpolee v ith filtering mouth shape. Heyer (1973), who investigated interactions among larvae of Thailand anurans, also describe beakless tadpoles of *M. ornata.* I have found tadpoles answering to Bourret's description, in all investigated habitats ; but these tadpoles answered also to descriptions of other *Microhyla* tadpoles prepared by Smirnov and Ho Thu Cuc (1982). These tadpoles after emerging (with body length of 7—8mm) are more similar in their body shape to another species, *M. butleri.* On the other hand, neistonophagous tadpoles swimming near the water surface and having dorsally directed mouth with keratinized teeth, can produce froglets of two



Fig·16
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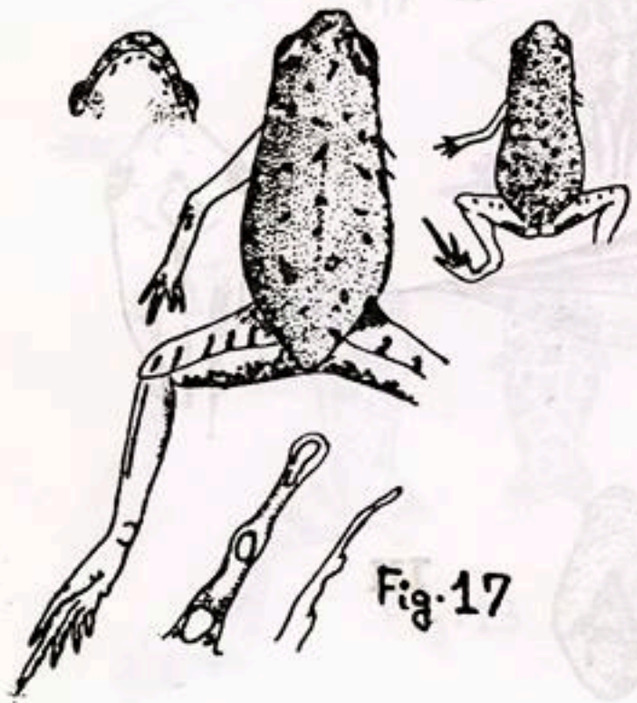
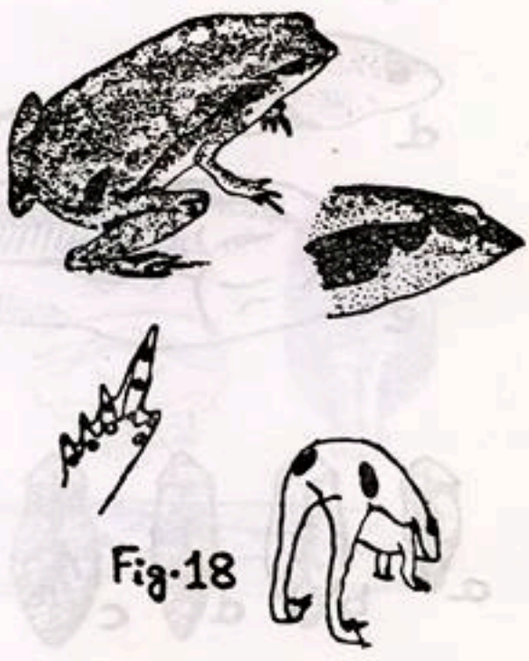


Fig·17



Fig·18

↑ M. erythropoda

length of eye. Tongue oval. Palatinal teeth absent. Head slightly broadened in the hind part. Skin smooth, slightly granulated on the lateral sides. Back gray with small spots of diameter less than 1 mm. Type specimen had about 20 small, irregularly situated spots of irregular shape. Paratype specimen had more than 40 round spots of 1 mm diameter. Temporal spots absent. Marbled dark pattern on the lateral sides, chin and forepart of belly. Ground colour of belly light-grey. Dorsal side of forelimbs and hindlimbs of alive frogs bright orange with dark irregular perpendicular lines (Fig. 17).

M. erythropoda differs from the most closely similar species, *M. inornata*, by presence of outer metatarsal tubercle, thinner body and different coloration pattern.

Type locality. Forest Ma Da, province Dong Nai, Vietnam.

Habitats. Adult females were found in the hours of light under the fallen logs in 300—500 m from the MD station, in the plots with the highest concentration of fallen leaves; near the Dipterocarpous trees, in August and October (the square E5, see Fig. 1). One metamorphosed specimen was found at the end of October in the square CB, under the log.

Kalophrynus pleurostigma Tschudi—Grain-spot frog.

Short description. Not a large frog. ♂: L=26.8—28.4 mm (27.4); L/Lc=3.05—3.34 (3.21); Lt.c/L=0.33—0.37 (0.35); Sp.oc/D.r.o=1.16—2.06 (1.68); Lo/Ltym=1.23—1.80 (1.48); F/T=0.86—0.95 (0.90); D p/C.int=1.1—1.2 (1.15); n=3. ♀: L=30 mm. Skin almost smooth, with very small grains. Legs short: tibiotarsal articulation reaches hind side of tympanum. Very small digital discs present (Fig. 18). Toes about half-webbed, except the fourth toe which is webbed in one-quarter. Length of the first and the second fingers equal. Inner and outer metatarsal tubercles of equal size. Snout short, narrow, sharpened. Back light-brown with weakly expressed character dark pattern. Large, dark bright spots on the base of hips. Temporal spots well expressed. Belly dark; in males—with expressed cream-coloured tubercles. Eggs and larvae were not found.

Distribution. Indo-China, Indo-Australian archipelago, Hong Kong. I have found all specimens in October, in MD forest.

Ecology. All animals were found near from the MD station. One of them at night, near the termitarium, feeding on termites; another at the hour of light in forest, far from water bodies. Differently from *Microhyla*

Distribution. Thailand, Cambojia, Vietnam and Southern China (Taylor, 1962). I have found *M. pulchra* in the forest of MD and DB.

Ecology. *M. pulchra* was found in all types of MD forest. It is the commonest of *Microhyla* species which specimens could be met during hours of light in shadowy places (juvenile frogs especially). This frog escapes the danger with great, more than 2 m, leaps. Mating calls could be heard at night near the pools on the roads; their density in October is about one-order times lower than the density of *M. ornata* and *M. heymonsi*. Spawns in stagnant, well-lightened pools, escaping the smallest ones (volume 401 and less). Newly deposited clutches appear until the end of October. Tadpoles keep in small groups, in the thickness of water. Tadpoles of developmental stages 25—42 (L=4—11 mm) were found in MD; but in DB (October) only early-stage larvae (stages 25—30; L=4—7.4 mm) were found. According to Heyer (1973), breeding of this species is more fragmentary than in *M. ornata* or *M. heymonsi*. Mating calls were registered until the end of October. At the same time, only one amplexed couple was found on the ground surface, near the pool.

Microhyla erythropoda sp. nov.

Type. In collection of ~~the Chair of Ecology, Tbilisi State Univercity~~ * I could not distinguish the species of this frog using available keys of amfibians of South-Eastern Asia (Bourret, 1942; Taylor, 1962; Inger, 1967; Dao Van Tien, 1977). The frog belongs to the genus *Microhyla*, judging from the structure of the cranium, analyzed by dr. S. V. Smirnov (IEMAE acad. sci. of Russia). It doesn't belong to *Microhyla* species described by previous authors for Vietnam and Thailand. Designated new species.

Description. Small frog. ♀: L=26.1—27.2 mm; L/Lc=3.58—4.08; Lt.c/L=0.32—0.34; Sp.oc/D.r.o=1.47—1.76; Lo/Ltym=1.92—2.00; F/T=0.93—0.98; D.p/c.int=4.14 (n=2). Body broadened slightly in the hind part. Forelimbs comparatively long and thin, hindlimbs thin and short, Tibiotarsal joint doesn't reach hind part of tympanum. Fingers free, toes with rudimentary web. A small digital disc present. The second finger slightly longer than the first one and equal to fourth. The second toe slightly longer than the second one but shorter than 5th. Fifth toe slightly shorter than the third. Inner metatarsal tubercle middle-sized. Outer is duplicated; Average length of two outer metatarsal tubercles is almost equal to the length of inner tubercle. Snout obtuse. Distance between nostrils slightly shorter than eye length but 1.5 times longer than the distance from nostril to eye. The length of tympanum is equal to the half

* Zoological Museum of the Moscow University, Russia: № A-3276, Microchyla s,