The unique Lower Cretaceous locality Baissa and other contemporaneous fossil insect sites in North and West Transbaikalia

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ZHERIKHIN, V.V., MOSTOVSKI, M.B., VRSANSKY, P., BLAGODEROV, V.A. & LUKASHEVICH, E.D. 1999. The unique Lower Cretaceous locality Baissa and other contemporaneous fossil insect sites in North and West Transbaikalia. In: AMBA/AM/PFICM98/1.99: 185-191. The Lower Cretaceous lagerstaette Baissa at Vitim River and other fossil insect sites in Buryat Republic are reviewed in geological, paleontological, taphonomical and paleoenvironmental aspects.

Key words: Lower Cretaceous, Transbaikalia, Buryat Republic, Insecta, fossils, paleoecology.

Non-marine Lower Cretaceous deposits are widespread in Transbaikalia (i.e. the southern part of East Siberia between Lake Baikal in the west and the Argun' River in the east) and often contain abundant and diverse fossils. The western part of this area within the administrative borders of the Buryat Republic is less investigated in this respect than the eastern part belonging to the Chita Region. In particular about thirty localities of Lower Cretaceous insects have been discovered in Buryatia while their number in Chita Region exceeds one hundred. A peculiar insect fauna of the *Ephemeropsis melanurus-Coptoclava* type often occurs in the Lower Cretaceous of Buryatia whereas in Chita Region it is totally replaced by the assemblage with the mayfly *E. trisetalis* EICHW. (for more details see SINITSHENKOVA, this volume). The insects are usually accompanied with the osteoglossomorph fish *Lycoptera*, the phyllopod crustacean *Bairdestheria*, and the ostracods *Lycopterocypris eggeri* MAND. and *Cypridea foveolata* MAND.

The best known localities are concentrated within the Vitim River basin at the extreme northeast of Buryatia. The Upper Vitim area is a plateau of about 1000 m heigh formed mainly by Palaeozoic granites overlain by Pleistocene basalts, with a number of small Mesozoic depressions filled with Lower Cretaceous deposits. Some insect fossils were discovered for the first time near the mouth of the Konda River as early as 1897 during the surveying for the Trans-Siberian railway (REIS 1910). A dozen insect-bearing sites have been found since that time. The richest and most exciting one is situated at the left bank of the Vitim River downstream of the Baissa Creek mouth. Fossil insects were collected here for the first time by K.S. ANDRIANOV in 1939. Since the 50s the geological and paleontological studies were continued by MARTINSON (1961), KOLESNIKOV (1964), SCOBLO (1964), and LYAMINA (1980). The locality was explored repeatedly by expeditions of the Paleontological Institute (1959, 1961, 1969, 1979, 1983) and the expeditions of EURUS'97 and AMBA projects operated under the auspices of UNESCO (1997, 1998). The collection of Baissa insects housed in the Paleontological Institute now includes more than 20,000 specimens.

The Lower Cretaceous sediments at the Vitim Plateau are divided into the Endondin, Khysekha and Zaza Formations (LYAMINA 1980). The Endodin Formation is represented mainly by the coarse-grained clastics while the Khysekha Formation is volcanic-sedimentary. The Zaza Formation sediments exposed at Baissa are represented mostly by sandstones, siltstones, marls, and bituminous shales (paper shales) (Fig. 1). The total thickness of a continuous section at Baissa is hardly more than 80 m. The lowest part of the section consists of proluvial and alluvial sediments overlain by rhythmic fine-grained lacustrine deposits; some gritstone lenses occur also in the middle part of the section. There are marl fragments (containing the faunistic assemblage identical to that of the overlying lacustrine sediments) in the breccias and conglomerates of the lowermost exposed part of the section indicating that those coarse-grained deposits could not form the true base of the sequence. Numerous small consedimentary disturbances within the lacustrine deposits indicate a high tectonic activity during the time of sedimentation. There is also an upthrow fault of uncertain vertical separation in the middle part of the outcrop. The upthrown beds 11 to 2 (after MARTINSON 1961) contain the insect assemblage similar to but not identical with the assemblage found in beds 35 to 31 while the assemblage discovered in the middle part of the sequence is clearly different.

Insect remains occur throughout the section except for the most coarse-grained rocks but their abundance and state of preservation vary strongly from one bed to another as well as within the same bed. The well-preserved insects are nearly restricted to the marls while in the bituminous shales they are always in a poor condition. It should be emphasized that this situation is typical for the Mesozoic of Siberia and Mongolia in general whereas there are numerous records of well-preserved fossil insects from the Cenozoic bituminous shales in different parts of the World. This taphonomic difference is intriguing and may indicate that the conditions of burial differ considerably between the Mesozoic and Cenozoic stratified meromictic lakes. As many as several thousands specimens may be recovered from one square meter of a marl. Intact fossils with preserved appendages are not rare. Even the smallest insects such as male coccids are conserved perfectly (KOTEJA 1988, 1989). Some fossils, especially those of beetles and bugs, are more or less three-dimensional. The cuticle is often well preserved, demonstrating very delicate structures such as microsetae and sensillae (VRSANSKY & al. 1998). Occasionally the gut content is preserved, and pollen grains were detected in the guts of sawflies (KRASSILOV & RASNITSYN 1982). No fossils were investigated chemically but perhaps the state of chemical preservation is also exceptional. Some large aquatic insects, especially dragonfly larvae, demonstrate just after splitting of the rock a pinkish colour of the eyes which disappears usually in a half of hour; perhaps they contain the chemically preserved rhodopsine decaying rapidly when contact with air.

Excellently preserved spiders, conchostracans, ostracods, gastropods, pelecypods, fresh-water bryozoans, fishes, and bird feathers are found besides the insects as well as diverse plant fossils. In particular, the colonies of fresh-water bryozoans described recently by VINOGRADOV (1996) are unique and unrecorded from any other fossil locality in the World. The presence of angiosperms was predicted by RASNITSYN (1969) judging from the presence of some angiosperm-feeding insects like the cephid sawflies, and later confirmed by fossils, both leaves and pollen (VAKHRAMEEV & KOTOVA 1977; KRASSILOV 1986; BUGDAEVA 1995). Recently an incomplete skeleton of a reptile or a bird has been discovered which is under preparation now; some bone fragments of a small tetrapod were found also in a coprolite. Trace fossils are also abundant. In particular, the caddis cases occur frequently in diverse rocks including not only marls and bituminous shales but also sandstones and the shelly limestone above the basal breccias. The fauna of Baissa well represents the above-mentioned «*Ephemeropsis melanurus - Coptoclava*» type.

The collection is partially undescribed, and the total number of taxa may be estimated only putatively. Baissa is the only locality in the World where all 25 pterygote orders known as fossils from the Lower Cretaceous are found, namely Ephemeroptera, Odonata, Grylloblattida, Plecoptera, Blattodea, Mantodea, Isoptera, Dermaptera, Orthoptera, Phasmatodea, Psocoptera, Mallophaga, Thysanoptera, Homoptera, Heteroptera, Megaloptera, Raphidioptera, Neuroptera, Coleoptera, Mecoptera, ?Aphaniptera (*Saurophthirus*), Trichoptera, Diptera, Lepidoptera, and Hymenoptera, comprising in total no less than 195 families. The number of species in the collection may be estimated cautiously as about 700 but more probably it exceeds 1,000; 273 insect species and nine species of insect trace fossils are presently named. There are also undescribed members of at least five families of spiders. Most insect species are known only from Baissa but few are recorded also from other localities in Buryatia and Mongolia; interestingly, there are no common species between the Baissa fauna and the Lower Cretaceous fauna of Eastern Transbaikalia except for *Coptoclava longipoda*. The latter may be, however, a species complex rather than the single species.

The Baissa insect fauna includes both taphonomically autochthonous lacustrine and diverse allochthonous components (the taphonomical autochthonity is treated here in a broad sense, as burial within the same lake where the insects lived). The autochthonous insect assemblage includes no less than 50 to 80 species. It is dominated by the aquatic stages of Diptera, Odonata, Coleoptera, and Heteroptera as well as by the caddis cases. The aquatic larvae are often represented by moulting

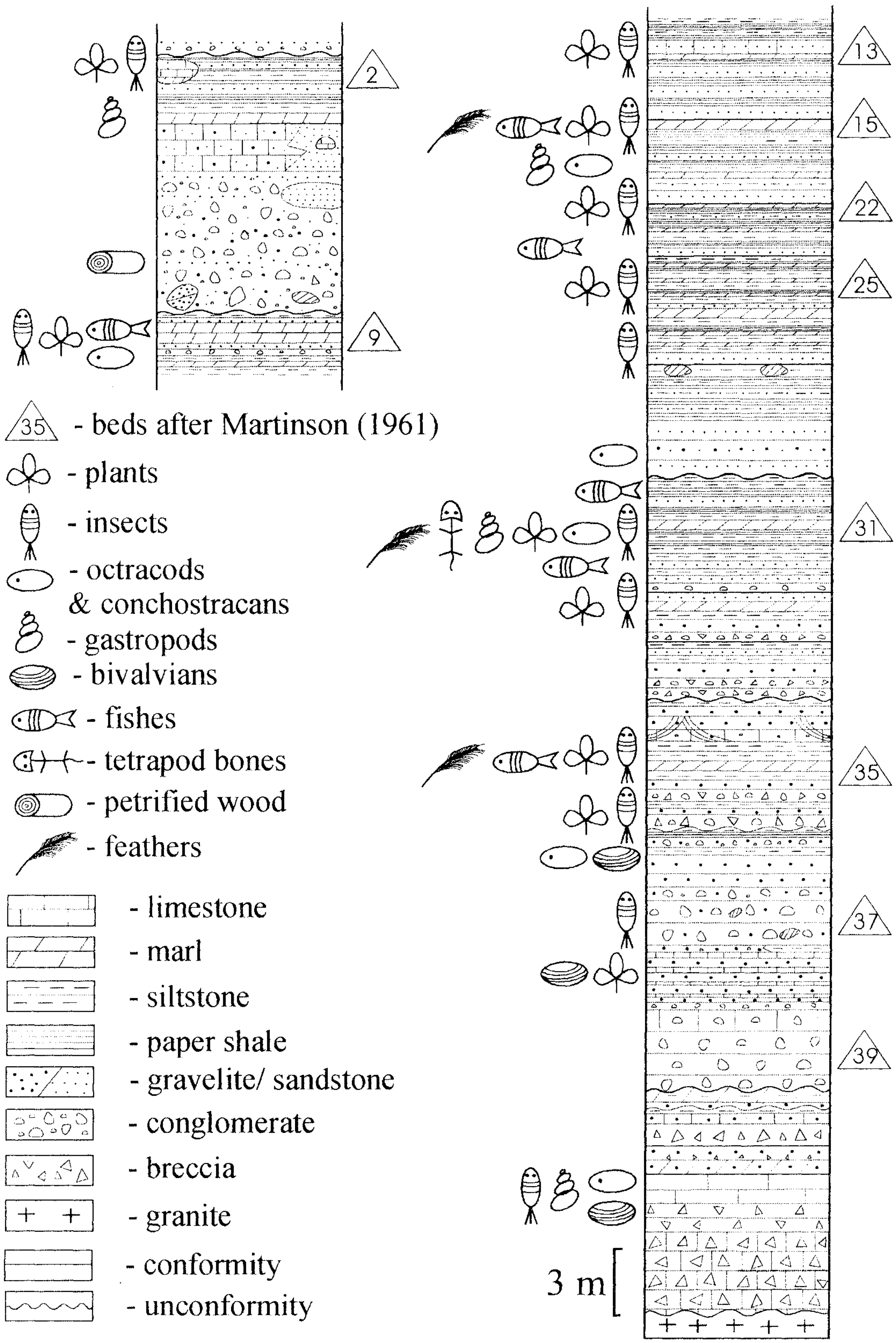

Fig. 1. Stratigraphic column of Baissa locality, left and right part of the outcrop respectively.

Fig. 1. Stratigraphical column of the Baissa section.

skins which are generally much more abundant than dead individuals. There are only few occasional evidence of mass mortality when the dead chaoborid and coptoclavid larvae are crowded locally on few bedding surfaces indicating a local drying up. Interestingly, in all these cases the coptoclavid larvae are of the same instar suggesting the same season of drought. There is no evidence of suffocation episodes. The flying adults of lacustrine insects are common and often may be associated confidently with the aquatic stages. For instance, *Hemeroscopus baissicus* PRITYKINA is the only common dragonfly species occuring throughout the section. The extremely abundant anisopteran nymphs undoubtedly represent the same species in spite of the hypothesis of BECHLY & al. (1998) about their belonging to a different family. *Cretotaenia pallipes* PONOMARENKO, placed originally to Adephaga *incertae sedis* (ARNOLDI & al. 1977) and abundant in some layers, is more probably the larva of the common hydrophilid beetle *Hydrophilopsia baissensis* PONOMARENKO. The association between the larvae and adults of the predacious aquatic beetle *Coptoclava* as well as between the larvae and adults of the dobsonfly *Cretochaulus lacustris* PONOMARENKO seems to be beyond question. Sometimes the problem is more complicated. Two mayfly species are distinguished on the base of winged specimens, *Ephemeropsis melanurus* COCK. and *E. martynovae* TSHERN., but the nymphs of the latter species are not recognized. The caddis cases were constructed probably mostly by members of the family Vitimotauliidae but both adults of this family and larval cases are represented by at least a dozen of species without any firm base for an association between them.

Few if any aquatic stages and caddis cases may represent a taphonomically allochthonous element transported by rivers. However, there are some flying adults belonging to typically lotic taxa such as stoneflies, blackflies and nannochoristid scorpionflies almost surely emerged from running waters. The adult dragonflies others than *Hemeroscopus* which are very rare but rather diverse should also represent the fauna of other water bodies existed around the lake.

The terrestrial insects are represented mostly by flying adults. However, the wingless stages of several species are common, including a shore bug possibly of the genus *Mesolygaeus* PING, the cockroach *Piniblattella vitimica* VISHN., and to a lesser degree the elcanid orthopteran *Baisselcana*. These insects most probably inhabited the lake shore immediately near water (VRSANSKY 1997). One more supposed member of the shore community is a common pygidicranid earwig belonging possibly to the genus *Archaeosoma* ZHANG.

The abundance of terrestrial insects varies considerably within the sequence but in general they are more common in more fine-grained off-shore sediments. This is in agreement with the WILSON'S (1980) observations on the distribution of insect remains in the Tertiary lacustrine deposits of North America. It should be noted that tiny creatures forming the air plankton clearly dominate numerically over stronger fliers. The winged aphids are especially abundant constituting about one third of the total number of terrestrial insects. Perhaps, the lake operated as a kind of a suction trap for small flying insects because of a temperature contrast between the water and the surrounding land. It is noteworthy that complete fossils of the smaller flying insects are common while the larger ones are represented mostly by isolated wings which may be explained by fish predation.

The water body is reconstructed as an intermontane lake with the depth of 20 - 30 meters (LYAMINA 1980) situated within a granite massif. The presence of thick layers of the bituminous shales shows that the lake was meromictic, with the oxygen deficiency and high hydrogen sulphur level in the hypolimnion. However, the oxygenated epilimnion should be thick, with a lower boundary well beneath the limit of episodic wave action because no suffocation events are documented. The abundance of caddisflies, dobsonfly larvae and other groups intolerant to oxygen deficiency shows that in more shallow areas the water was clear and well-oxygenated even near the bottom. The lake ecosystem was highly productive as indicated by its complex trophic structure (Fig. 2) with several levels of predators up to the large sturgeon-like fish *Stychopterus* as well as by the extremely high abundance of planctonivorous phantom midges (SINICHENKOVA & ZHERIKHIN 1996). Modern highly productive lakes are more or less eutrophic and considerably more saprobic. Possibly, this is a consequence of differences in the primary producers. In the Mesozoic there were no submerged higher plants, and the lake ecosystems were based either on algae or on supplies of an alien plant debris from the neighbouring areas. The role of the latter in a large water body was probably negligible, and the main source of the organic matter for the whole ecosystem should be the local algal growth. The reproduction rate of algae and, consequently, their annual production were high, but the grazing was very intensive, too. Thus only a relatively small portion of primary production was decayed, and the water remained clear like in modern oligotrophic lakes due to the perfect ecosystem recycling.

No fossils of tiny zooplankters fed on planctonic algae have been detected in Baissa but the mass burial of plankton-eating predatory phantom midges indicates that their food was plentiful. The remains of daphniid crustaceans are occasionally abundant in the next-door locality Khysekha at Zaza River where the insect assemblage is similar. The phantom-midges were consumed by larger predators such as *Hemeroscopus* dragonflies and *Coptoclava* beetle larvae, the *Clypostemma* backswimmers, and fishes. The adult *Coptoclava* probably hunted mostly on the water surface like modern whirligig beetles. The bottom algae were grazed by the mayfly larvae, caddisworms, and some other insects. The main benthic predators were the dobsonfly larvae (*Cretochaulus*) and perhaps some beetles.

Surrounding land was probably rather densely forested, with a *Psedolarix*-dominated forests at the slopes. The inhabitants of decaying wood were common and highly diverse as well as the inhabitants of the living trees such as various homopterans. Aphids form the dominating group of plant suckers, and auchenorrhynchan were also abundant and diverse while the psyllomorphs are nearly absent. A high diversity of insect parasitoids is a characteristic feature of Cretaceous faunas in comparisons with the Jurassic ones, many of them could parasitize wood-boring insects. The mycetophagous Diptera, both nematocerans and brachycerans, were also abundant. The supposed inhabitants of fern and horsetail meadows like the locustopseid grasshoppers are extremely rare as well as remains of the ferns and horsetails themselves indicating that there were probably virtually no coastal meadows, and the lake shore was occupied mainly by a *Podozamites* bush and *Czekanowskia* forest. The presence of presumed vertebrate blood-suckers is noteworthy. There are some adult blackflies but the most remarkable insects are *Saurophthirus*, a peculiar wingless mecopteroid probably related to the ancestral flea stock, and an undescribed member of the order Mallophaga found in 1998. *Saurophthirus* resembles strongly the modern bat parasites and probably was a parasite of flying reptiles (PONOMARENKO, 1976).

Two main terrestrial fossil assemblages are recognized, one restricted to the mid-part of the section (beds 25 -13) and another occurring in its lower part and reappearing again in the uppermost rhythms (Fig. 1). Some aquatic insects demonstrate the same distributional pattern. The mid-section assemblage is more diverse and enriched in more thermophilous taxa. However, the termites and mantids occur only in the lower part whereas the snakeflies are more common in the middle beds. Perhaps, in the Lower Cretaceous their climatic preference differed from the modern one; a comparison with the more southern Mongolian localities supports this hypothesis. The reversion of these faunistic changes and their coincidence in ecologically dissimilar taxa were explained by relatively short-time climatic oscillations (perhaps corresponding to the Milankovic cycles) as their most probable cause. Thus a warming episode during the time of sedimentation of the mid-part of the section was postulated (SUKATCHEVA 1968; ZHERIKHIN 1978; RASNITSYN 1980; KUZMINA 1985). However, the presence of a significant disturbance below the bed 11 complicates the interpretation of this pattern.

The age of Baissa assemblage is somewhat debatable. Most paleozoologists assign the Zaza Formation to the Neocomian, most probably Valanginian or Hauterivian. There are some common insect species between Baissa and Bon-Tsagaan of Mongolia (VRSANSKY 1997; BLAGODEROV 1998) but a comparative study of the Hymenoptera indicates that the Baissa deposits may be correlated with the Purbeck Beds of England while the Bon-Tsagaan fauna is younger, correponding better to the fauna of the Wealden Clay (RASNITSYN & al. 1998). However, palynologists and paleobotanists are inclined to believe that the Baissa deposits are younger, possibly Aptian, because of the presence of *Asteropollenites*, the angiosperm pollen appearing in other regions only in the upper Lower Cretaceous (VAKHRAMEEV & KOTOVA 1977). This type of pollen also occurs in the faunistically similar deposits in Transbaikalia and Mongolia. Perhaps, the plants produced *Astero-pollenites* had appeared much earlier in Transbaikalia and Mongolia than in other parts of the World. In any case, the faunistic data indicate pre-Aptian, and most probably pre-Barremian, age of the Baissa paleolake. Thus Baissa and others contemporaneous localities in Transbaikalia are of a great importance for studies in the paleoenvironments of the earliest angiosperms.

The insects from other sites at the Vitim Plateau

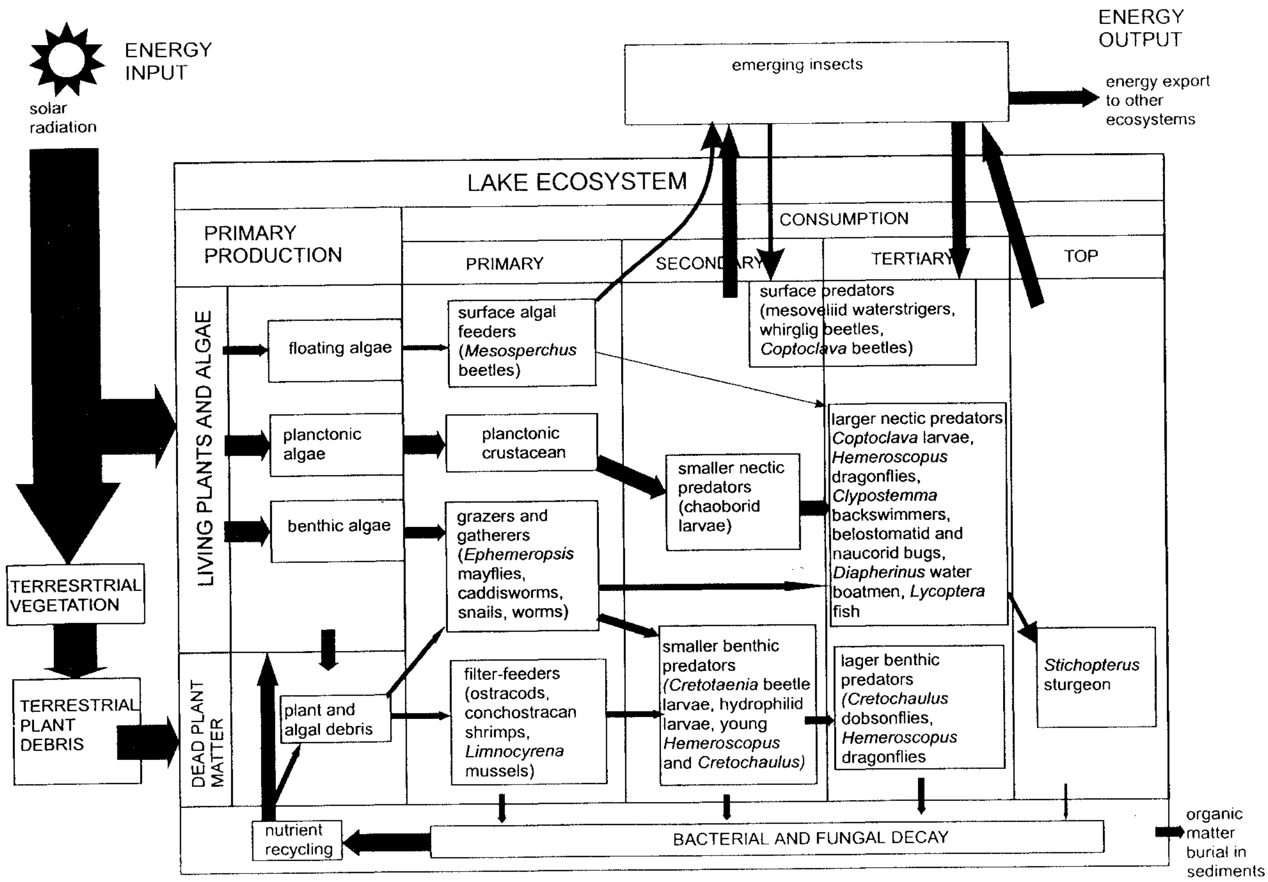

Fig.2. Hypothetical structure of the Baissa lake ecosystem.

(including a small collection from the Khysekha Formation at Zaza River) are similar with those from Baissa except for one site, Romanovka, situated 100 km downstream. In Romanovka *Ephemeropsis*, *Hemeroscopus*, and *Coptoclava* are totally absent, the caddis case assemblage is strongly dominated by *Pelindusia*, the ichogenus quite rare in other localities, and the snakefly genus *Cretoraphidia* is represented by *C. certa* PONOMARENKO, the species not found in Baissa; on the other hand, there is a specimen of *Clypostemma* possibly belonging to the Baissa species *C. xyphiale*. The locality Butui situated in a half-way between Baissa and Romanovka was also considered by ZHERIKHIN (1978) as faunistically peculiar but in 1998 both *Ephemeropsis* and *Coptoclava* have been collected here. Outside the Vitim Plateau some Lower Cretaceous insects were discovered in the Dzhida, Kizhinga, Khilok, and Gusinoye Ozero Depressions in Western and Southern Buryatia (see ZHERIKHIN 1978 for a review; besides the specimens mentioned in this paper an incomplete damselfly wing was collected recently from the upper Lower Cretaceous Kholboldzhin Formation in the Kholboldzhin Coal Pit at Gusinoye Ozero). *Ephemeropsis* and *Coptoclava* are recorded from the Kizhinga and Khilok Depressions; small collections available from the Dzhida and Gusinoye Ozero areas contain no insect species common with the *E. melanurus-Coptoclava* assemblage (except for some caddis case ichnospecies) and their fauna may be of a different type(s).

References

ARNOLDI, L.V., ZHERIKHIN, V.V., NIKRITIN, L.M. & PONOMARENKO, A.G. Mezozoiskie zhestkokrylye. Trudy Paleontologicheskogo Instituta AN SSSR 161, 204 pp. (in Russian) [English translation: 1992 Mesozoic Coleoptera. Smithsonian Institution, Washington, D.C., 285 p.)]

BECHLY, G., NEL, A., MARTÍNEZ-DELCLOS, X. & FLECK, G. 1998. Four new dragonflies from the Upper Jurassic of Germany and the Lower Cretaceous of Mongolia (Anisoptera: Hemeroscopidae, Sonidae and Proterogomphidae). *Odonatologica*, 27 (2), 149-186.

BLAGODEROV, V.A. 1998. Fungus gnats (Diptera, Mycetophilidae) from the Lower Cretaceous of Mongolia. *Paleontologicheskiy Zhurnal*, 6, 53-59 [in Russian]

BUGDAEVA, E.V. 1995. Cretaceous flora from Baisa locality (Transbaikalia, Russia). Abstracts of International Conference of diversification and evolution of terrestrial plants in geological time, Nanjing, 26.

KOLESNIKOV, Ch.M. 1964. Stratigraphy of non-marine Mesozoic of Transbaikalia. In: Stratigraphy and palaeontology of Mesozoic and Cenozoic deposits of East Siberia and Far East. Nauka Publ., Moscow, Leningrad, 5-138. [in Russian]

Koteja, J. 1988. Eomatsucoccus gen.n. (Homoptera, Coccinea) from Siberian Lower Cretaceous deposits. *Annales zoologici*, 42 (4), 141-163.

KOTEJA, J. 1989. Baisococcus victoriae gen. et sp. n. - a Lower Cretaceous coccid (Homoptera, Coccinea). *Acta zoologica cracoviensis*, 32 (6), 93-106.

KRASSILOV, V.A. 1986. New floral structure from the Lower Cretaceous Baikal area. *Review of Palaeobotany and Palynology*, 47 (1-2), 9-16.

KRASSILOV, V.A. & RASNITSYN, A.P. 1982. The unique finding: pollen in the gut of Early Cretaceous sawflies. *Paleontologicheskiy Zhurnal*, 4, 83-96. [in Russian]

KUZMINA, S.A. 1985. New orthopterous insects of the family Phasmomimidae from the Lower Cretaceous of Transbaikalia. *Paleontologicheskiy Zhurnal*, 3, 59-65 [in Russian]

LYAMINA, N.A. 1980. 'Stratigraphy and genetic types of Lower Cretaceous deposits in depressions of the South of Vitim plateau'. PhD thesis, Irkutsk, 153 p., 9 tbls, 42 figs. [in Russian]

MARTINSON, G.G. 1961. The Mesozoic and Cenozoic molluscs from continental deposits of Siberian platform, Transbaikalia and Mongolia. *Trudy Baikalskoi limnologicheskoi stantsii AN* SSSR, 19, 332 pp. [in Russian].

PONOMARENKO, A.G. 1976. A new insect from the Cretaceous of Transbaikalia, possible parasite of flying reptiles. *Paleontologicheskiy Zhurnal*, 3, 102-106 [in Russian]

RASNITSYN, A.P. 1969. Origin and evolution of the lower Hymenoptera. *Trudy Paleontologicheskogo Instituta AN* SSSR, 123, 184 pp. [in Russian].

RASNITSYN, A.P. 1980. Origin and evolution of Hymenoptera. *Trudy Paleontologicheskogo Instituta AN SSSR*, 174, 192 pp. [in Russian].

RASNITSYN, A.P., JARZEMBOWSKI, E.A. & ROSS, A.J. 1998. Wasps (Insecta: Vespida = Hymenoptera) from the Purbeck and Wealden (Lowe Cretaceous) of southern England and their biostratigraphical and palaeoenvironmental significance. *Cretaceous Research*, 19, 329-391.

REIS, O.M. 1910. The fauna of the fish shales of the Transbaikal Region. Geologicheskiya izsledovaniya i razvedochnye raboty po linii Sibirskoi zheleznoi dorogi, St.-Petersbourg, 29, 1-68 [in Russian].

SCOBLO, V.M. 1964. The Cretaceous system. In: Florensov, N.A. (ed.). Buryat ASSR. 1. Geologic Description. *Geologiya SSSR*, vol. 35. Nedra Publ., Moscow: 237-256 [in Russian].

SINITSHENKOVA, N.D. & ZHERIKHIN, V.V. 1996. Mesozoic lacustrine biota: extinction and persistence of communities. *Paleontological Journal*, 30(6), 710-715.

SUKATCHEVA, I.D. 1968. New Mesozoic caddisflies of Transbaikalia. *Paleontologicheskiy Zhurnal*, 2, 59-75. [in Russian]

VAKHRAMEEV, V.A. & KOTOVA, I.Z. 1977. Ancient angiosperms and associated plants from the Lower Cretaceous deposits of Transbaikalia. *Paleontologicheskiy Zhurnal*, 4, 101-109. [in Russian]

VINOGRADOV, A.V. 1996. A new eurystomate bryozoan from Cretaceous deposits of Transbaikalia. *Paleontologicheskiy Zhurn*al, 1, 115-116 [in Russian].

VRSANSKY, P. 1997. Piniblatella gen. nov. - the most ancient genus of the family Blattellidae (Blattodea) from the Lower Cretaceous of Siberia. *Entomological Problems*, 28(1), 67-79.

VRSANSKY, P., QUICKE, D.L.J., BASIBUYUK, H.H., FITTON, M.G., ROSS, A., RASNITSYN, A.P. & VIDLICKA, L. 1998. The oldest insect sensillae. First Paleoentomological Conference, 30 Aug. - 4 Sept., 1998, Moscow, Russia. Abstracts, 44.

WILSON, M.V.H. 1980. Eocene lake environments: depth and distance-from-shore variation in fish, insect, and plant assemblages. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 32: 21-44.

ZHERIKHIN, V.V. 1978. Evolution and changes of the Cretaceous and Cenozoic faunistic assemblages (Tracheata and Chelicerata). *Trudy Paleontologicheskogo Instituta AN SSSR*, 165, 198 pp. [in Russian]