



PUBLISHER'S TRANSLATION INTO ENGLISH

Nazarenko A.A.* (2012) New details on the early stage of Great tit (*Parus major*) and Japanese tit (*Parus minor*) settlement of the Amur River basin, and inception of hybridization between them // *Far East. J. Orn.* 3: 47–52.

SUMMARY

The first specimen of Great tit from Amur River basin was collected on the Shilka River in the eastern Trans-Baikal in May, 1855 by R. Maack (1859), and breeding by Japanese tits was strictly proved in 1869 at Lake Khanka, in southwest Ussuriland (Przewalski, 1876), but not any further north. Examination of high-quality colour photographs of the type specimen of *P. m. bargaensis* (Yamashina, 1939), collected on 22 April, 1935 on the eastern shore of Lake Dalainor (in the western foothills of the Great Khingan Mountains), has conclusively shown that it was a hybrid between *P. major* and *P. minor*.

The referred figures and tables are in the original article in Russian, pp. 47—52

The relationships between the populations *major* and *minor* of the «great» tits in the middle Amur Region, one of the textbook examples of Mayrian evolutionary biology (Mayr, 1968), is unique in its multifaceted elaboration, in particular, in terms of time/space, the use of modern methods of molecular genetics and systematics, ecological assessments, and just field observations. There were two independent field teams, «Vladivostok's» in 1991–1996 (Nazarenko et al., 1999; Kvist et al., 2002; P ckert et al., 2005, etc.) and «Moscow's» in 1970–2012; the latter was headed by N.A. Formozov (Formozov et al., 1993; Fedorov et al., 2006, 2009; Kapitonova et al., 2011, et al.). Their contributions, in my view, well supplement each other.

I would like to specially mention the recent article (Kapitonova et al., 2011) as directly pertaining the «space/time» problem. It is based on the material unique in scope, which was carefully analyzed and considered in relation to specific areas and time. It emphasizes the stability of the dispersal trends against the background of a dynamic, including unstable, abundance of local

populations. These are very realistic estimates, which allows regarding them as a conceptual model to explain, for example, the early history of the emergence of *P. major* and *P. minor* populations in the Amur River basin.

Acquaintance with publications by R.K. Maack (1859) and N.M. Przewalski (1876) helped to clarify the details of the time and place of localization of the populations of these species in the Amur River basin in the middle of the 19th century. In connection with the annexation of the Amur Region to Russia (1858), the Siberian Division of the Imperial Russian Geographical Society carried out a number of complex, as we would say today, expeditions to study the geology, wildlife, and population of the Amur River basin (Zakharenko, 2008). The expedition to survey the Amur River from its sources in 1855 was headed by R.K. Maack. The main preparations for the expedition were performed in April–May in Nerchinsk, the largest town in eastern Transbaikalia at the time. The first birds were also collected here.

As was customary at that time, the ornithological chapter of Maack's book (pages 113–151) included data on the birds from other, previously places visited: Irkutsk, Lake Baikal, and Yakutia, including the Viljui River valley. As an ethnographer, he carefully described the details of life of the aboriginal population, including houses.

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For example, even then the barn swallow *Hirundo rustica* nested on Yakut yurts (Maack, 1859, page 132), and the magpie *Pica pica* had clearly bent to human settlements and was encountered in all Tungus villages along the middle Amur River valley (l.c., p. 125).

The Great tit is mentioned in this book once only. The specimen was collected on May 5 (May 18, New Style) 1855 in Shilka near the Nerch River estuary (l.c., page 125). However, it is important to make an important ecological note: anyone who gets into the settlements in the Trans-Baikal region for the first time is impressed by the lack of woody shrubs and even trees in them. I had an opportunity to see, on the internet, a series of excellent photos of Nerchinsk and its immediate vicinities made before the Revolution. It was a completely naked city, with pastures beginning on its suburbs, with obvious signs of overgrazing. Such settlements could hardly be a favorable environment for the Great tit.

According to E.V. Kozlova (1930, p. 222), in the mid 1920's the Great tit was a scarce species in the southern Transbaikalia. Although the birds kept near villages, they nested exclusively in riparian poplar forests, including the mountain terrains. In winter, the birds migrated to more southern areas, up to the almost treeless Gobi-Altai. Today, they spend the winter mainly in settlements, including Chita, and occupy adjacent forests and woodlands in the spring (Shchekin, 2007).

These facts suggest that, there could hardly exist a highly productive population of the species in eastern Transbaikalia at the time of Maack, which could ensure a population excess. In addition, both Shilka and Amur Rivers rounded the Greater Khingan Range in the north and flowed through a remote mountain taiga area, which was then almost uninhabited. Naturally, Maack has no opportunity to examine three Chinese towns that existed at that time on the right bank of the Amur River upstream of its place where it crosses the Lesser Khingan Range. Neither is there any evidence of former habitation of the Great tit in the north of the Manchuria (Yamashina, 1939). Nevertheless, small numbers

of these birds were observed by G. Radde in the spring of 1858 (Radde, 1863) near the Bureya River mouth, but not further eastwards, because the Great tit was not found at all in the Lesser Khingan Range, where Radde spent two years (1858 and 1859), conducting stationary research and collecting specimens, basing in the Cossack village that was later named in his honor (Zakharenko, 2008). It can be assumed that this was a failed attempt of this species to spread to the east, and the later settling along the Trans-Siberian Railway took place in fact.

It is also interesting that stationary studies in Birakan village and the results of counts performed in a number of other settlements, including Birobidzhan, showed that the «modus vivendi» of the Middle-Amur population is different from that of the Transbaikalian population (see above) (Nazarenko et al., 1999). In the Middle Amur Region, the birds not only winter in settlements but also nest there with a high density (l.c., fig. 3, p. 376). This difference can be explained not only the fact that now these settlements abound in green wood but also by the fact that various buildings in the residential sector and the numerous technical and engineering facilities, including those located near the railway, create ideal conditions for building nests, although in most cases these nests are inaccessible for inspection (Nazarenko et al., 1999, p. 373). In adjacent forests, which are presented today mostly by brush woods, there is a severe shortage of hollows. This conclusion is made not only on the basis of the low density of Great tits in them but also on the fact that the same hollows are occupied annually, even if they are of a poor quality (very tight and close to the ground, or filled with water during heavy rains).

In general, it was the perfectly favorable environment created by humans in the Middle Amur basin that contributed to the fast growth of the Great tit population and its territorial expansion in recent decades, which was convincingly demonstrated by L.V. Kapitonova et al. (2011). For me, the disinclination of Great tits to disperse in the southern direction remains a complete mystery.

The Japanese tit. The environment potentially suitable for this species already existed in the middle Amur River valley (the most southern portion of its course) during the expedition of R.K. Maack: he noted the ubiquitous presence of oak and other broad-leaved trees on the high banks of the river and the presence of large oak woods among vast tall-grass meadows (later called the Amur prairie) in the valley east of the Lesser Khangan Range. During the same trip, he explored the forests in the Greater Khekhtsir near the Ussuri River estuary, and once worked there in June 1859 (Maack, 1861). But neither there nor in the middle reaches of the Ussuri, which places its right coast is mountainous and directly adjacent to the river, and where, as now, was to be oak stands (Nazarenko et al., 1999, p. 380), he found this species.

In the book by N.M. Przewalski (1870, p. 52), there is only a general mentioning of this species in the Ussuri region. However, the book describing the results of his first trip to Inner Asia (Przewalski, 1876), more specific comments can be found (p. 52): «... By voice and way of life, the described tit not differ from our *P. major*» (?). And further: «In the Ussuri region, *P. minor* occurs quite often: in the middle of June, I often found fledged immatures on Lake Khanka» (p. 52). It is known, however, that the only area where he collected specimens and worked for certain in summer is the mountain-forest area to the west of Lake Khanka between villages (stanitsas at that time) Turii Rog, on the border with China, and Kamen'-Rybolov. In addition, he explored the valley of the lower reaches of the Lefu River (now the Ililstaya River) on the Khanka Plain. It was in May–June 1869, and it is here where he began his return to Russia.

Meanwhile, a careful reading of books by Maack and Przewalski, together with his above quote regarding the comparison of the great and Japanese tits, suggest that young Przewalski, as a naturalist, was markedly inferior to Maack. The latter gives surprisingly accurate and sharp observations of birds. Undoubtedly, Przewalski knew well large birds, including the game birds. In general, the northern boundary of the Japanese tit

range in the Ussuri region was apparently located in the vicinities of Lake Khanka in those years.

The time when hybridization between the Great and Japanese tits began

In March 2006, thanks to assistance of Dr. Edward Dickinson, c/o The Trust of Oriental Ornithology, I was provided with an opportunity to examine color photographs (of a very good quality) of the type specimen of *Parus major bargaensis* Yamashina, 1939 (collection No. 19037, museum No. YIO-00128) at the depositary of the Yamashina Institute for Ornithology, Japan. It is known (Yamashina, 1939, p. 481) that this specimen (adult male from a pair) was collected on April 22, 1935, in a treeless terrain on the eastern shore of Lake Dalainor near the confluence of the Khailar River, flowing from the western slope of the Greater Khingan Range. The wing length of this specimen is 73.0 mm (l.c., p. 481), which corresponds to the minimum value of this trait in *major* males formally outside of the contact area with a *minor* population (Nazarenko et al., 1999, p. 374, table). The color of the bottom of this specimen is very light, almost white, with a slight yellowish tinge. The outermost tail feathers, according to the two pictures, carry broad and long white stripes.

In this context, it is important to note that, of the nine Great tit specimens collected by me on June 20–22, 1992, in the vicinities of the town of Shimanovsk, which is formally located outside of the contact area of these species, one specimen was classified into the category «light major» (see below). It is remarkable that this specimen had a minor haplotype (Pöckert et al., 2005, table 1, N 1276, p. 160); i.e., was a hybrid. With allowance for these data, the representative specimen *bargaensis* can be classified as a hybrid between *major* and *minor* of the «light/white major» category (Nazarenko et al., 1999, p. 373), and it can be assumed that the hybridization between the two species began at least in the mid-1930s.

It is difficult to interpret the place of this finding. However, it is known that, during autumn migrations, the birds can fly sufficiently far away from their breeding areas (Kozlova, 1930; Kapito-

nova, 2012). In addition, strictly speaking, the western boundary of the minor population in the middle Amur River basin before that time remains unknown. It can be only noted that, in the same article (Yamashina, 1939, p. 481), four minor specimens are mentioned (two adult males and two young birds collected in the period between August 1 and 19, 1935, in the vicinities of the town of Aihon, on the other bank of the Amur River opposite to Blagoveshchensk. It is also symptomatic that the population of the Great tit in the southeastern Transbaikalia, on the basis of the trait of a paler back and abdomen, was distinguished as the subspecies *P. major kapustini* Portenko, 1954, which is not recognized now. It would be highly desirable to perform a molecular genetic screening of this population.

To conclude, I have to give a critical commentary on the recently published article by L.V. Kapitonova (2012), because its contents may mislead an unqualified reader. This article reviews the cases of vagrancy and introduction of the Great and Japanese tits in different places and areas on the eastern boundary of Asia and the importance of «ecological routes» (railways) in this phenomenon. The author of this article also decided to track (in real time as well) the dispersal of the Japanese tit in the Central Sikhote-Alin. She misread the article by L.M. Shul'pin (1931), attributing to him the discovery of a nonexistent finding of this species in the middle Sikhote-Alin. Let me quote her: «In the basins of Botchi and Kopi Rivers, *P. minor* was recorded by L.M. Shul'pin (1931) in 1928 as one of the southern species coming far to the north along the eastern and west Sikhote-Alin. Note that Shul'pin mentioned a significant transformation of these areas by humans» (Kapitonova, 2012, p. 603). However, L.M. Shul'pin never worked in the Central Sikhote-Alin in general and in the basins of Kopi and Botchi rivers in particular!

In his article (Shul'pin, 1931), he clearly indicates where and when he worked in 1926–1928. In 1928, the area of his work was the extreme north of the Sikhote-Alin Mountains (near Lake Kizi) and the sea coast northward of De Kastri Bay. In these areas, the Japanese tit has not yet

nested to date. In fact, L.M. Shul'pin in 1927 made the northernmost (at the time) record of this species near the sea coast, in the vicinity of Tetyukhe village (now Dal'negorsk), which belongs to the southern Primorye. Referring to A.A. Emel'yanov (1929), who collected bird specimens in the basins of Kopi and Botchi rivers, located northwards, he especially emphasizes the lack of this tit in his collections. Let me quote him: «Among the species unknown there [Kopi, Botchi] but found by me in this trip [Tetyukhe], I should mention ... *Parus major wladivostokensis* ...» (Shul'pin, 1931, p. 597). Indeed, in 1908–1910, in this region, which was well developed already in that time, the Japanese (White-bellied then) tit was not found (Chersky, 1915, pp. 232, 233).

Finally, I would like to give a brief commentary on the role of the Komsomolsk–Vanino–Sovetskaya Gavan township railway as an «ecological route» for the dispersal of the tit species discussed. This railway crosses, almost at a right angle, the Sikhote-Alin Mountain Range between its central and northern parts. It has regularly operating since with 1947. Today, at least 10 railway stations with perfect features of «ecological islands» can be specified between the end points: they are separated from each other by an average of 40 km, has well planting of greenery, and their environs are represented by meadows or pastures, and diverse woodlands that have nothing to do with the dark coniferous taiga that grew here earlier.

I have chosen Vysokogornyi township, which is located in the axial part of the Sikhote-Alin range, as a model. For seven monitoring seasons (2004–2012., with a two-year skip), neither the Great tit nor the Japanese tit have been recorded here in late June–early July, even with their songs being specially played. However, in another model area (Sovetskaya Gavan–Gatka village), the Japanese tit was found immediately and was then regularly observed there over the years. However, strangely enough, during a thorough survey of Vanino township as such, including the large holiday village in its vicinities, which was performed in 2004, none of the two species was identified here. In the same year, at the end of June, we also visited Gurskoe village/station

(formerly Khungari), which is the western foothills of the Sikhote-Alin Range. The Japanese tit was detected immediately; however, the size of this local population was small. The preliminary results of studies of these «ecological islands» were published earlier (Nazarenko et al., 2006).

Thus, an «ecological routes» can be effective only when there is a sufficiently potent population pool takes place in the region, which may to create an excess of population. Apparently, this is not yet the case in the Lower Amur region.

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