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## RESEARCH ARTICLE

# Distribution of Yellow Wagtail Forms *Motacilla flava* – Complex in the North of Western Siberia, Russia

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**Abstract:** On the basis of the materials obtained from the studies carried out from 2000 to 2015, we present the data on distribution of the Yellow Wagtail forms in the north of Western Siberia, *i.e.* within the overlapping boundaries of the ranges of a complex set of several polytypical forms – *Motacilla flava* sensu lato. Four forms have been identified here: two forms from the group of Western Yellow Wagtails (*M. f. thunbergi* and *M. f. beema & flava*) and two forms from the group of Eastern Yellow Wagtails (*M. t. plexa* and *M. t. tschutschensis*). Western “black-headed” form *M. f. thunbergi* is spread in the area of the northern taiga, forest tundra and south shrub tundra within the Ob River basin, while eastern “black-headed” form *M. t. plexa* is found in the shrubby tundra and further to the east from the Ob River in forest tundra and northern taiga. Western “light-headed” wagtails *M. f. beema & flava* spread as far as 65°05'N along the floodplain of the Ob River. Eastern “light-headed” wagtail *M. t. tschutschensis* penetrates the Taz peninsula and, through the anthropogenic sites, the north-east coast of the Yamal Peninsula, *i.e.* the Sabetta area as far as 71°14'N. The entire range of the Yellow Wagtail is characterized by the interchange of zones inhabited by “black-headed” (without the expressed eyebrows on males) and “light-headed” (with notable eyebrows on males or white-headed) forms from the north to the south.

**Keywords:** Yellow Wagtail, Colour Form, Distribution, Western Siberia.

## 1. INTRODUCTION

Yellow Wagtail is known as a complex set of polytypical forms – *Motacilla flava* sensu lato [1]. Some authors describe it as a set of geographical races or subspecies of a single polytypic species *e.g.*, [2, 3]. Others identify two separate groups based on differences in morphology and genomic elements, namely: western Yellow Wagtail, including such forms as *flava*, *iberiae*, *cinereocapilla*, *thunbergi*, *pygmaea*, *beema*, *leucocephala*, *zaissanensis*, *flavissima*, *lutea*, *feldegg*, *melanogrisea*, and eastern Yellow Wagtails, consisting of *tschutschensis*, *simillima*, *plexa*, *taivana*, *macronyx* [4 - 6]. Moreover, the status of independent species is proposed for *M. lutea* (Yellow-Headed Wagtail) and *M. feldegg* (Black-Headed Wagtail) among western wagtails, the rest being regarded as forms or subspecies *M. flava*. Separate species *M. taivana* (Green-crowned Yellow Wagtail), *M. macronyx* (Southeast Siberian Yellow Wagtail) and *M. tschutschensis* (Eastern Yellow Wagtail) are distinguished among eastern wagtails with the latter group combining such forms as *tschutschensis*, *simillima*, *plexa* [4, 5, 7].

The most significant differences between Eastern and Western Yellow Wagtails are sexual dimorphism, which is clearer in the group of Western birds [4, 5, 8, 9], and the color of the juvenile plumage [10]. It is also believed that the Western Wagtails have rounded claws of hind toes, while the Eastern – long rounded (*M. tschutschensis*) or long straight claws (*M. taivana*, *M. macronyx*). Differences in outward appearance of the forms within polytypical species *M. flava* and *M. tschutschensis* are attributed to the colour of male plumage.

The most discussible form is *M. f. thunbergii*, common in Northern and Eastern Europe, often sympatric with

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nominative subspecies *M. f. flava* [4, 5, 11, 12]. The coloration of the northwestern *M. flava thunbergii* males does not differ from the north Siberian *M. tschutschensis plexa* males. Coloration of the *thunbergii* females is similar to that of *flava*, *bema*, *leucocephala* forms, but differs from the *plexa*, *tschutschensis* females. *Thunbergii* form is believed to have resulted from hybridization of *M. tschutschensis plexa* males and *M. f. flava* females). The distributional pattern of these forms in geographical areas of their contact (especially in the north of Western Siberia) becomes significant for understanding the situation. In this paper, we present data on the distribution of different forms of Yellow Wagtails in the north of Western Siberia within the Yamal-Nenets Autonomous District, Russia.

While some authors believe that here lies the distribution area of *M. flava thunbergii* [13], others consider it to be the distribution area of *M. tschutschensis plexa* [14]. Latitudinally, the southern boundary of the range of these forms stretches to the Ob River as far as 56-61°N [13 - 15]. The northern Yellow Wagtails meet here with *M. flava beema*, which is more common in the south. In the sympatric zone, the subspecies are well-distinguished by their biotopical preferences: for nesting, *thunbergii (plexa)* mainly selects moss tussock marshes, while *beema* prefers the meadows, lowland bogs and anthropogenic habitats (fields of perennial grasses, wasteland) [15, 16]. In the north of the Novosibirsk region, a single nesting of *plexa* was observed in anthropogenic grassy wetland, which is more *bema* preference [17]. Some authors state that the eastern boundary of the *thunbergii (plexa)* range passes along the Yenisei River [13], while others believe that it goes along the Kolyma River [14].

## 2. MATERIALS AND METHODS

We have analyzed color photographs and bird carcasses from the collection of the Institute of Plant and Animal Ecology UD RAS for form identification of Yellow Wagtails in different parts of the Yamal-Nenets Autonomous District, Russia. We used the photos taken in the period from 2000 to 2015 (before this period of time no color photos were available in vast numbers). Georeferenced data of locations are shown in Table 1. Yellow Wagtail is a common or numerous bird in almost all of these areas. We used binoculars (12X) for visual observation, while photos illustrate the distribution or the presence of certain forms in the respective area.

**Table 1. Observation sites.**

No.	Name	Zone	Region	Coordinates		Material
				N	E	
1	Voykar	Northern Taiga	Lower Ob River basin	65°46'	64°02'	photo
2	Azovy-Gorki	Northern Taiga	Lower Ob River floodplain	65°03'	65°06'	photo
3	Muzhi	Northern Taiga	Lower Ob River floodplain	65°25'	64°55'	photo, carcasses
4	Aksarka	Forest tundra	Lower Ob River floodplain	66°43'	68°06'	photo
5	Yarsale	Forest tundra	Lower Ob River floodplain	66°43'	71°07'	photo
6	Kharp	Forest tundra	Lower Ob River basin	66°46'	66°23'	carcasses
7	Porsyakha	Southern tundra	Southern Yamal peninsula	67°24'	71°04'	carcasses
8	Novy Port	Southern tundra	Yamal peninsula	67°52'	72°25'	photo
9	Erkuta	Southern tundra	Yamal peninsula	68°13'	69°10'	photo
10	Yurkharovo	Southern tundra	Taz peninsula	67°46'	77°00'	photo

For form identification, we focused on the color of males and females in pairs. In the north of Western Siberia, we detected two main types of male and female coloration. In males it is the presence or absence of a light brow (Fig. 1), which can vary in its width (A1 and A2). One type of female coloration (C) is characterized by a very slight difference between the head and the back, though the intensity of yellow on the belly and chest can be different. This coloration corresponds to the distinguished sexual dimorphism: females differ much from males. The females of the second type of coloration (D) have a gray-blue head that is markedly different from the color of the back. This type of coloration is similar to the males (unpronounced sexual dimorphism).

The form identification of the Yellow Wagtail was based on combination of different types of male and female coloration in breeding pairs: female C × male A = *M. flava beema (flava)*; female C × male B = *M. flava thunbergii*; female D × male A = *M. tschutschensis tschutschensis*; female D × male B = *M. tschutschensis plexa*.

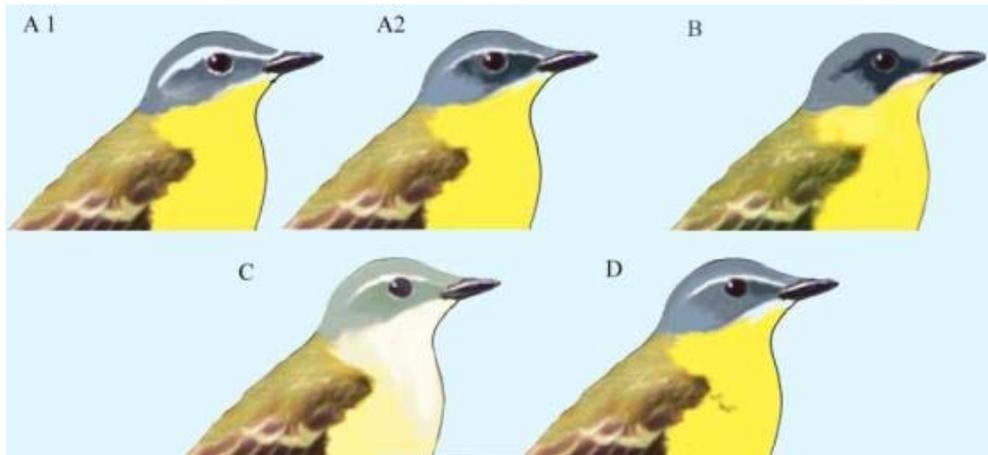


Fig. (1). Main types of male (A, B) and female (C, D) coloration, detected in the north of Western Siberia.

### 3. RESULTS

Two forms, *M. flava thunbergi* and *M. tschutschensis plexa*, are common in the north of Western Siberia. Their typical habitat is tussock tundra moss bogs and shrubby tundra (Photo 1). The *M. flava thunbergi* (Photo 2) occupies vast area of all Low Priobye region, where is living on tundra moss bogs. In the Lower Ob River floodplain, *M. flava thunbergi* usually nest in the same habitats situated on the islands. However, they can sometimes be found in the shrubby meadows to the south of the Arctic Circle, *i.e.* in the areas specific to *M. f. beema* which is common in the south [13, 14]. Several pairs of this form of Yellow Wagtail (*M. f. beema*) were observed in the Ob River floodplain in 2012 in the vicinity of Gorky place (65°03'N and 65°05'N, 65°11'E) (Photo 3). Judging from the alarmed behavior of the birds, they may have been nesting there. A pair of wagtails, with the male looking more like *M. f. flava* (Photo 4), was also observed in the same area (64°51'N and 65°07'E) in 2014. The birds were also seen in the floodplain meadows with shrub patches.

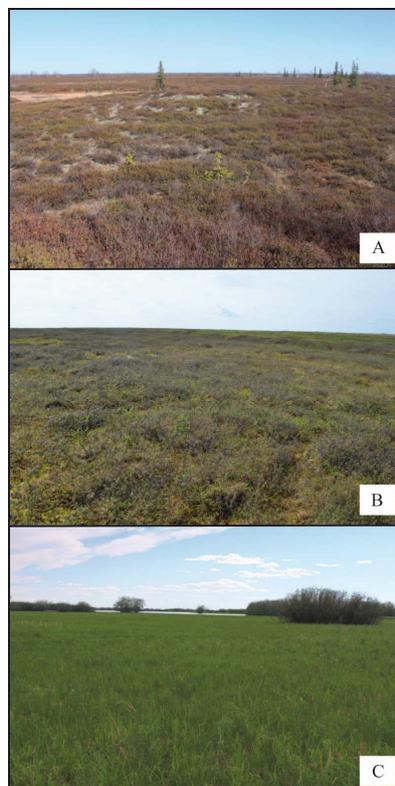


Photo 1. Yellow Wagtails' habitats in the north of Western Siberia: A - tussock moss bog (Voykar, 31.05.2010); B – shrubby tundra (Yurkharovo, 14.06.2015), C - meadows of the Lower Ob River floodplain (Azovy, 24.06.2014).



**Photo 2.** *M. flava thunbergi* in Lower Ob River basin (Voykar) (13.06.2007): **A** – male, **B** – female, **C** – pair.



**Photo 3.** *M. flava beema* in Lower Ob River floodplain (Azovy) (25.06.2012): **A** – male, **B** – female.



**Photo 4.** *M. flava flava* in Lower Ob River floodplain (Azovy) (28.06.2014): **A** – pair, **B** – male.

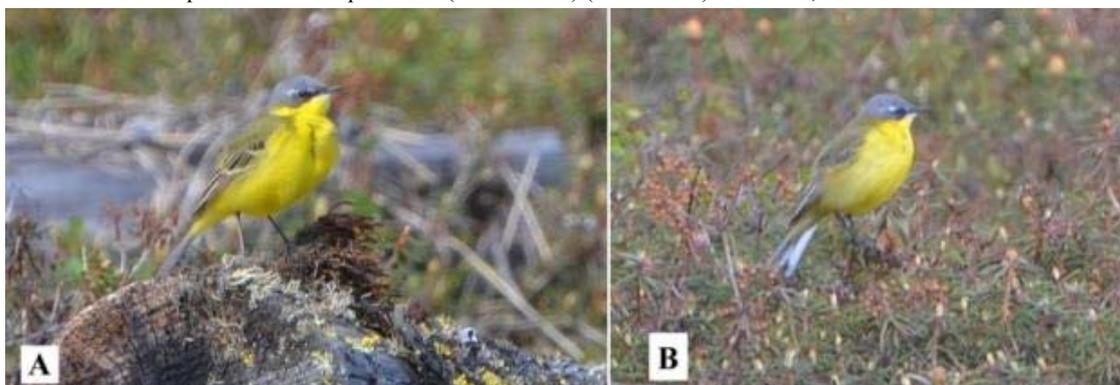
Three forms were observed in Yurharovo area (the Taz peninsula): *M. flava thunbergi* (Photo 5) and both *M. tschutschensis* – *plexa* (Photo 6) and *tschutschensis* (Photo 7). All of them shared the same habitats, *i.e.* shrub tundra with some alder and willow bushes up to 3 m high.



**Photo 5.** *M. flava thunbergi* in the Taz peninsula (Yurkharovo) (12.06.2015): **A** – pair, **B** – male.



**Photo 6.** *M. tschutschensis plexa* in the Taz peninsula (Yurkharovo) (12.06.2015): **A** – male, **B** – female.



**Photo 7.** *M. tschutschensis tschutschensis* in the Taz peninsula (Yurkharovo) (12.06.2015): **A** – male, **B** – female.

*M. tschutschensis plexa* (Photo 8) were found in the southern shrubby tundra of the Yamal Peninsula (Erkuta, Novy Port). A breeding pair of Yellow Wagtails *M.t. tschutschensis* (Photo 9) was observed in 2015 in the vicinity of the Sabetta village (71°14'N, 72°08'E), which is substantially further to the north of their main range.



**Photo 8.** *M. tschutschensis plexa* in the Southern Yamal (Novy Port) (13.07.2014): **A** – male, **B** – female.



**Photo 9.** *M. tschutschensis tschutschensis* in the Northern Yamal (Sabetta), (photo by L. Demongin): **A** – male, **B** – female.

Practically no data that could be used for accurate identification of the Yellow Wagtail (although this species is quite common in this area) is available for the vast territory of the northern taiga in the Nadym, Pur, Taz river basin. There is some evidence of *M. tschutschensis plexa* existence near Noyabrsk (63°10'N, 75°33'E) [7] and in the area of Tarkosale (64°56'N, 78°19'E) [18].

In the Polar Urals Mountains, Yellow Wagtails do not nest [19] and there is a discontinuity in the species' range there.

#### 4. DISCUSSION

Distribution of the Yellow Wagtail in the north of Western Siberia is represented in Table 2 and Fig. (2). Western “black-headed” form (*M. f. thunbergi*) is spread in the area of the northern taiga, forest tundra and south shrub tundra within the Ob River basin, while eastern “black-headed” form (*M. t. plexa*) is found in the shrubby tundra and further to the east from the Ob River in forest tundra and northern taiga. Western “light-headed” wagtails (*M. f. beema & flava*) spread as far as 65°05'N along the floodplain of the Ob River. East “light-headed” wagtail *M. t. tschutschensis* penetrates the Taz peninsula and, through the anthropogenic sites, the north-east coast of the Yamal Peninsula, *i.e.* the Sabetta area as far as 71°14'N.

**Table 2.** Forms of Yellow Wagtails identified in the north of Western Siberia (in accordance with Fig. 2).

No.	Place	Coordinates		Form
		N	E	
1	Voykar	65°46'	64°02'	<i>M. flava thunbergi</i>
2	Azovy	65°03'	65°06'	<i>M. flava thunbergi, M. f. beema (flava)</i>
3	Muzhi	65°25'	64°55'	<i>M. flava thunbergi</i>
4	Aksarka	66°43'	68°06'	<i>M. flava thunbergi</i>
5	Yarsale	66°43'	71°07'	<i>M. flava thunbergi</i>
6	Kharp	66°46'	66°23'	<i>M. flava thunbergi</i>
7	Porsyakha	67°24'	71°04'	<i>M. flava thunbergi</i>

(Table 4) contd....

No.	Place	Coordinates		Form
		N	E	
8	Novy Port	67°52'	72°25'	<i>M. tschutschensis plexa</i>
9	Erkuta	68°13'	69°10'	<i>M. tschutschensis plexa</i>
10	Yurkharovo	67°46'	77°00'	<i>M. flava thunbergi</i> , <i>M. tschutschensis plexa</i> , <i>M. t. tschutschensis</i>
11	Sabetta	71°14'	72°08'	<i>M. t. tschutschensis</i>
12	Noyabrsk	63°10'	75°33'	<i>M. tschutschensis plexa</i>

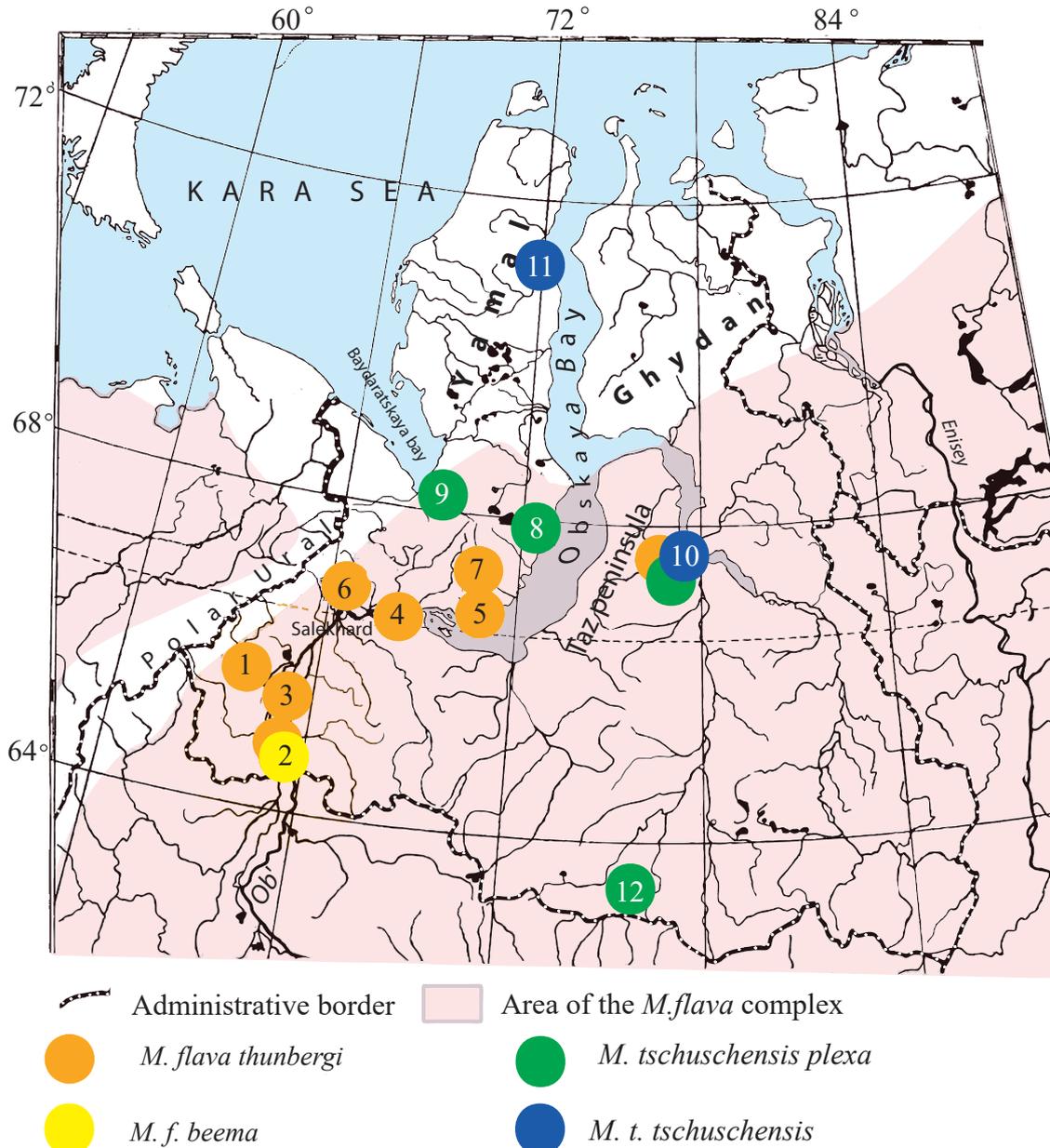
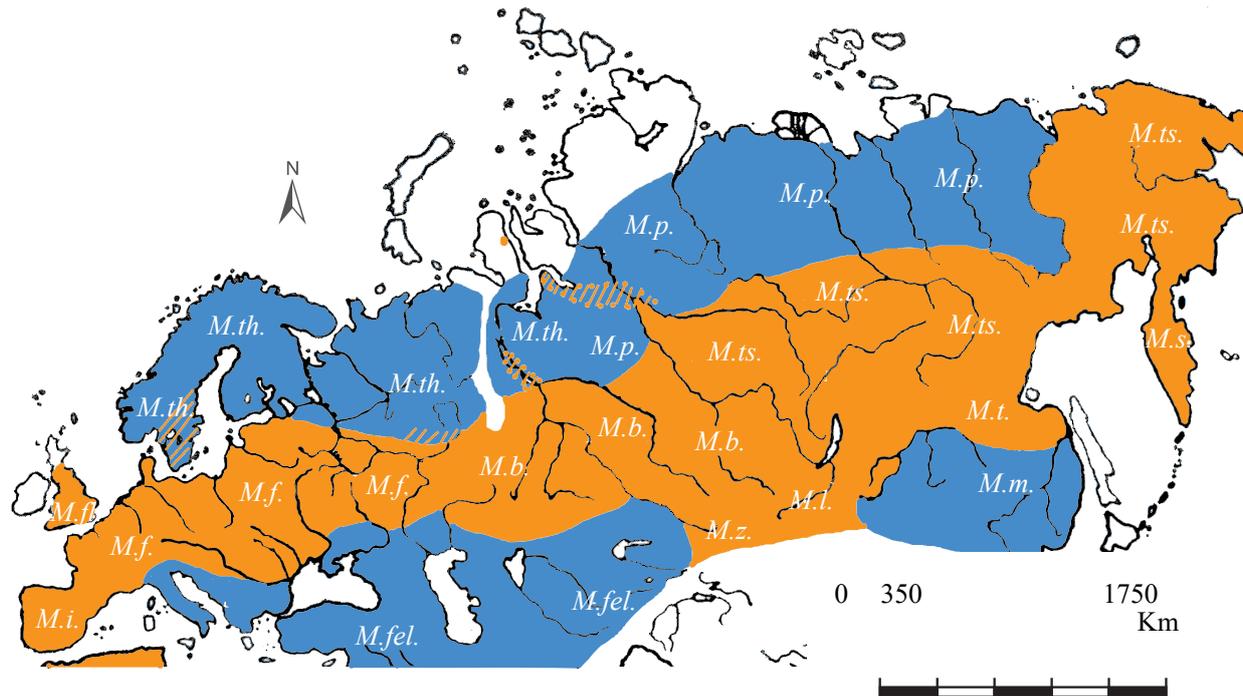


Fig. (2). Distribution of different forms of Yellow Wagtails in the north of Western Siberia (points 1-12 according to Table 2).

The entire range of the Yellow Wagtail is characterized by the interchange of zones inhabited by “black-headed” (without the expressed eyebrows on males) and “light-headed” (with notable eyebrows on males or white-headed) forms. From the north to the south, the distribution zones of “black-headed” forms give place to zones of “light-headed” forms, and then again to “black-headed” ones (Fig. 3). It is clear that different forms of birds and transitional coloration can simultaneously occur within the overlapping boundaries of the ranges and thus, the boundaries are rather conventional. How to explain such an interchange is still an open question that requires special studies.



**Fig. (3).** Distribution of different forms of the complex of Yellow Wagtails within its range. Blue color represents “black-headed” forms (without eye-brows): *M.th.* – *thunbergii*; *M.p.* – *plexa*; *M.c.* – *cinereocapilla*; *M.fel.* – *feldegg*; *M.m.* – *macronyx*. Orange color represents “light-headed” forms (with eye-brows): *M.i.* – *iberiae*; *M.fl.* – *flavissima*; *M.f.* – *flava*; *M.b.* – *bema*; *M.ts.* – *tschutschensis*; *M.z.* – *zaisanensis*; *M.l.* – *leucocephala*; *M.t.* – *taivana*; *M.s.* – *simillima*. Hatched zones represent the area where several forms can be observed. (By Gladkov, 1954; Ödeen & Björklund 2003; Ryabitsev 2014; our observations).

### CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

### ACKNOWLEDGEMENTS

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