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Quo vadis *Equus hemionus hemionus* in Mongolia ?[1]

A. Stubbe, M. Stubbe, O. Shagdarsuren, N. Batsajchan, R. Samjaa

Abstract

Caused in studies on biodiversity in the South Gobi we were confronted with the human impact on animal communities and endangered animal species, especially the Asiatic Wild Ass. So was born the idea to organize an international conference with the aim to actualize the status of *Equus hemionus* in Central Asia and to find ways for better conservation of this species and its habitats. A short review is given on historical exploration, decreasing area and population number of the Dschiggetai. Today the range of the nominate form of *Equus hemionus* is located in the Gobi region of southern Mongolia/northern China only. Therefore international engagement is necessary to save this indicator species of the arid zone of Central Asia.

Keywords: history, exploration, Wild Ass, *Equus hemionus hemionus*, Central Asia

1. Welcome to the International Asiatic Wild Ass Conference 2005

Life history and exploration of *Equus hemionus hemionus* in Mongolia is a field of past richness of central Asiatic biodiversity and evolution of human society with its livestock in the last centuries and explosion of economic development with motorization of herdsmen in the countryside and progress in coal and ore mining in the beginning of the 1990s.

In the end of the 1990s we began our biodiversity studies in the arid zone, in South Mongolia. We have seen with open eyes the change of landscape use and change of biodiversity and the population countdown for one of the characteristic great ungulate species of the southern deserts and desert steppes, the Wild Ass *Equus hemionus hemionus*. So the idea for our international meeting "Asiatic Wild Ass Conference" (AWAC) together with Petra Kaczensky and her great engagement was born and organized from 10th to 13th of August 2005 in Hustai National Park/Mongolia with a very successful post-conference field trip into the Asiatic Wild Ass range of Manlaj Sum/South Gobi.

Our thank is going to all organizers of this important symposium: the Universities of Ulan Bator (NUM) and Halle/Saale (MLU), the Society for Technical Cooperation of Germany (GTZ), the German Research Foundation (DFG), the International Tachi Group (ITG), WWF Mongolia, the Ministry for Nature and Environment of Mongolia (MNE), the Mongolian National Commission for Conservation of Endangered Species (MNCCES) and the Mongolian Academy of Sciences (MAS).

We feel bound to thank also the sponsors helping to save the valuable skeleton material of dead found Wild Asses: Dr. Waltraud Zimmermann and Prof. Dr. Nogge from Zoo Cologne as well as PD Dr. Arnd Schreiber from University Heidelberg.

In the name of the organizers we had welcomed participants from India, Russia, USA, Mongolia, Germany, China, Israel, Iran and Austria. From Tanzania came Patricia Moehlmann, Speaker of the IUCN Equid Specialist Group, to our symposium.

The aims of the conference were to discuss the status quo of Asiatic Wild Ass populations, to analyze the anthropogenic influences on populations and to summarize all results in a paper of understanding with the goal of better coordinated nature/species conservation in Central Asia, especially *Equus hemionus hemionus* in the Gobi region of Mongolia and China.

[1] Results of the Mongolian-German Biological Expeditions since 1962, No. 281.

Fig. 1: Above left: the organizers of the AWAC, M. Stubbe (MLU Halle) and R. Samjaa (NUM), behind; in front O. Doržraa (MNCCES), P. Kaczensky (ITG) and N. Bandi (NP Hustai Nuruu). Above right: N. Spasskaya, D.A. Blank, V.S. Lukarevskiy and E. Sidorenko. Below left: P. Moehlmann and R. Samjaa. Below right: D.I. Rubenstein and N. Spasskaya.

The Mongolian-German Biological Expedition began in 1962. More than 70 Mongolian scientists were qualified at the Martin-Luther-University Halle and more than 30 in our expeditions. It's always a great adventure to meet these colleagues, also some of them here in Hustai Nuruu. It was a great honour that the famous lady of Mongolian sciences Madame Prof. Dr. A. Dulmaa from the Mongolian Academy of Sciences took part in our conference. The Mongolian-German cooperation had continued over 45 years. It's a great history and we will give signs for the future!

Fig. 2: AWAC 2005 - Welcome by Prof. Dr. A. Dulmaa and J. Jargal.

Fig. 3: AWAC session under chairmanship of R. Samjaa, O. Doržraa and P. Kaczensky.

Fig. 4: AWAC session under chairmanship of D. Tsendjav, N. Bandi and Ch. Walzer.

2. Historical reports on Wild Ass in Mongolia

It is thanks to Gertrud and Helmut DENZAU to prepare our knowledge on Wild Asses by a fantastic monograph (1999). Spectacular photo documents, own observations and investigations by the authors have set new standards. Our review is limited on the distribution area of the nominate form *Equus hemionus hemionus* in Mongolia and the related terrain of China an Russia. At the beginning of our symposium it seems to be wise to remind and to pay tributes to the achievements of precede generations of researches in this field. Further deep historical research has done A. SCHREIBER (2007, in this volume); therefore we will give here only a short overview.

Up to the end of the last century especially western standard works as that of ELLERMAN & MORRISON-SCOTT (1966) or DUNCAN (1992) in the "IUCN-Action Plan for the Conservation of Wild Equids" show how few partly are the expertises from the Central Asiatic refuges on the distribution, taxonomy, and on quantitative data. Or differently said - how the quite numerous eastern literatures were negated.

The Wild Ass is known quite well from Mongolia a long. Drawings on stones with Equids are showing the knowledge of previous hunter generations. That is very clear documented in the volume "Old Art of Mongolia" by NOWGORODOWA (1980). Already in the 13th century the Franciscan Wilhelm von RUBRUK (HERBST 1925) met big herds of Wild Asses in Mongolia. Other data of the existence of Dschiggetais in eastern parts of Mongolia, where the species today is disappeared are basing on GERBILLON (1698, see HENZE 1983), IAKINF-BIČURIN (1828) and others. The Jesuit padre GERBILLON reported after his traverse through Mongolia on an animal similar to a mule which was named "Chickley". This designation comes from the Tunguses and Kalmuks (DENZAU & DENZAU 1999) and means "Long ear".

Fig. 5: Stone drawings of Equids from Čuluutyn-gol (from NOWGORODOWA 1980).

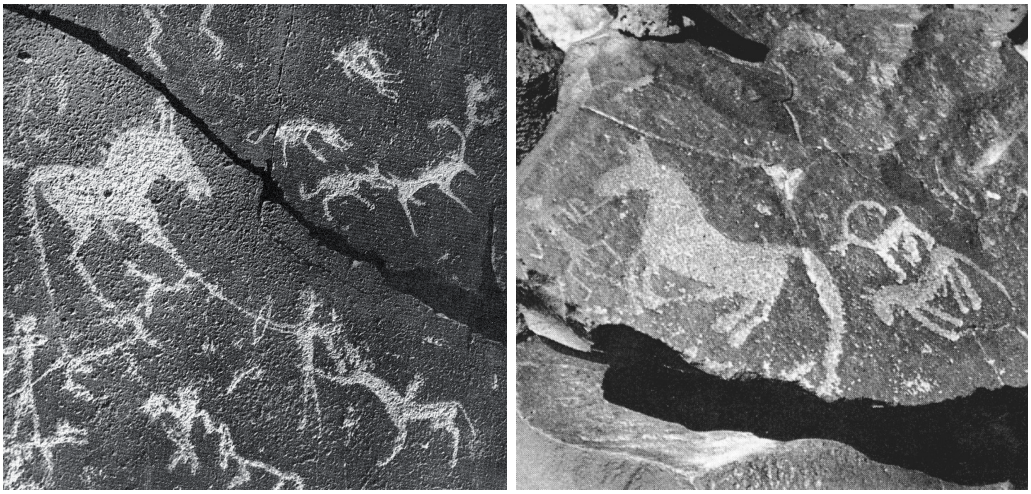


Fig. 6: Stone drawings of equids from Bičigtyn am and Tevš uul (from NOWGORODOWA 1980).

Daniel Gottlieb MESSERSCHMIDT, conferred a doctorate at the University Halle in 1713, met in the Daurian steppe between the rivers Onon and Argun the “Zigithay” and gave this animal the name “*Mulus foecundus”* or “*Zigithay Davurici*”. MESSERSCHMIDT (WINTER et al. 1966) reached at the 19th of August 1724 the Borsja river (50° 19' N), a tributary of the Onon:

"Die Tungusen, so mir geschusset (den Transport durchgeführt hatten), beschenkten mich mit ein paar rauhe Stiefeln aus Wolfsklauen, wogegen (ich) ihnen etwas Schar (Tabak) und Branntwein reichen ließe. Sie wurden aber hierauf alle zusammen auskommandieret, teils der Oblava (Treibjagd) der *Zigithay* wegen nachzugehen. … Umb 7 Uhr abends kamen Vasilij und Jakov, Slushiwen von der Oblava (Treibjagd) zurücke mit Rapport, daß zwei *Zigithay* gefället wären, und wurde also Michajla, Denstschik, nebst einen der Slushiwen mit Wagen zur Steppe gesendet, selbige zu holen. … Umb 11 Uhr (20. August 1724) mittags brachte Denstschik Michajla einen Zigithay, Masculum, welchen sie aber auf der Steppen eviszeriert hatten, so dass er nicht mehr dienete, beschrieben zu werden, sondern nur bloß abgezogen wurde. Den andern, so auch Masculus gewesen, hatten sie schon auf der Steppen abgezogen und das Fleisch unter sich verzehret. Ich konnte also hiebei weiter nichts fürnehmen, als dass ich die Slushiwen bestrafte, nicht besser zum rechten gesehen zu haben, und inzwischen zwei andere Slushiwen nebst den Tungusen wieder zur Oblava (Treibjagd) sandte, mir zwei andere unbeschädigte Tiere, nämlich Masculum et Foemellam, herbeizuschaffen. - Umb 9 Uhr abends brachten sie mir endlich *Zigithay*, Foemellam, und wurde selbige sofort aufgerichtet, so wie es zu Abzeichnung derselben requiriret ware. ... Nachmittags (21. August) zeichnete (ich) den Mulum Aristotelis dictum, степной конь Russorum, ein "davurisches Maultier", wobei ich den ganzen Nachmittags bis zum Abend Mühe und Arbeit hatte, weil ich in der finstern Jurten das Licht nicht gebührend moderieren konnte und die noch übrige Schattierung bis zum folgenden Tage verschieben musste. … Ich machte mich sofort (22. August) an die Abzeichnung des Muli foecundi Davurici und hatte bis 10 ½ Uhr damit zu schaffen, ehe ich fertig werden konnte, weil die Jurten sich nicht zur Malerei schicken. ... Hernach nahme ich seine dimensiones partium externarum wie gebräuchlich nach rheinländischem Fortifikationsmaße ab, wobei ich abermal bis 2 Uhr nachmittags zu tun fande. … Umb 2 Uhr musste Denstschik Andree nebst zweien Tataren das Fell abziehen und wurde allererst gegen 4 ½ Uhr nachmittags damit fertig. Das Fell sollte gegerbet werden, allein die Tataren berichteten, daß es viel härter und widerspenstiger denn die Pferdefelle (wäre), auch also von ihnen niemals könnte bearbeitet weden, welches denn abermal beweislich machte, daß es kein Pferd sei nach der Russen Benennung, sondern ein veritables Maultier, wie denn bekannt, daß die asininae pelles, aus welchen die Palimpsesti (mehrmals beschriebene Pergamente) gemacht werden, sehr hart und zähe sein. … Ich nahme also umb 4 Uhr nachmittags dissectionem Muli foecundi für, bei welcher ich mit der bloßen evisceratione bis zum finstern Abend zu tun hatte. "

Daniel Gottlieb Messerschmidt (1685–1735)
The First Explorer in Siberia

The scientific exploration of Siberia began with the expedition of the doctor Daniel Gottlieb Messerschmidt (1685–1735). Messerschmidt, who came from Danzig, returned there to practise as a doctor after studying medicine in Jena and Halle from 1713 until 1718. He was recommended to Peter the Great by the natural scientist Johann Philipp Breyne (1680–1764) and after meeting Peter on a visit to Danzig, was invited to St. Petersburg and commissioned with a longterm expedition to study the natural history, the peoples, the history and the geography of Siberia. He began the journey in 1719, travelling first to Tobol'sk and from there to Krasnoyarsk, Mangaseia and along the river Nishnaia Tunguska to the Lena – 1721/22 accompanied by the Swedish prisoner-of-war Johann Philipp (Tabbert) von Strahlenberg (1676–1747). From Irkutsk he travelled through Transbaikalia and along the Chinese and Mongolian frontiers, returning in 1727. The results of Messerschmidt's scientific work – although often far ahead of his time (e.g., "Ornithologicon" and "Sibiria perlustrata") – have not been published to this day. They provided the members of the Second Kamchatka expedition with their most valuable material for preparing the later expedition. Messerschmidt died in poverty in St. Petersburg in 1735. In 1737 his young widow married Georg Wilhelm Steller.

Fig. 8: Curriculum vitae and a part of the published diaries of D.G. MESSERSCHMIDT (from: Terra incognita Siberia. – published by the Francke Foundation, Halle/Saale 1999).

Fig. 7: Portrait of J.G. GMELIN and the following curriculum vitae from: Terra incognita Siberia. - Francke Foundation, Halle/Saale 1999.

The German explorers of Siberia Gerhard MÜLLER and Johann Georg GMELIN visited 1735 Dauria. GMELIN (1752) has mentioned the migration of Wild Ass from Mongolia into the Argunian steppes. In Irkutsk he saw hunted animals from Transbaikalia (wilde Maulesel). GMELIN scribed at 4th of August 1735in his diary:

"Am folgenden Tag (04.08.1735) kamen wir noch vormittags durch vermischte Steppe an derjenige Stelle des Borsa-Baches an, welche dem in den hiesigen Gegenden berühmten Salzsee gegen über liegt. Hier fassten wir den Schluß uns etwas aufzuhalten, theils den Salzsee, welcher aus dem Wege lieget, zu besehen, theils eine Jagd der Tungusen, welche sie wegen der in diesen Steppen berühmten wilden Maulesel (Tschigitai) vornehmen sollten, abzuwarten. … Wir blieben des folgenden Tages liegen, und warteten auf die wilden Maulesel….Unsere ausgeschickte Jäger kamen den folgenden Morgen mit der nicht erfreulichen Nachricht zurücke, daß sie keinen Tschigitai hätten können zu sehen bekommen, ohngeachtet sie bis an die Gränze deswegen gegangen waren. Sie sagten uns, die Steppe sey zuweilen, absonderlich in trockenen Jahren so voll davon, daß man sie herdenweise laufen sehe, weil sie alsdann aus der Mongoley ihrem Vaterlande wegen Mangel an Wasser entliefen. Sie beschrieben sie von Gestalt,

Beschaffenheit des Leibes und Farbe, als ein lichtbraunes Pferd, wovon sie sich aber dadurch unterschieden, daß sie einen Kuhschwanz und sehr lange Ohren hätten."

Johann Georg Gmelin (1709–1755)

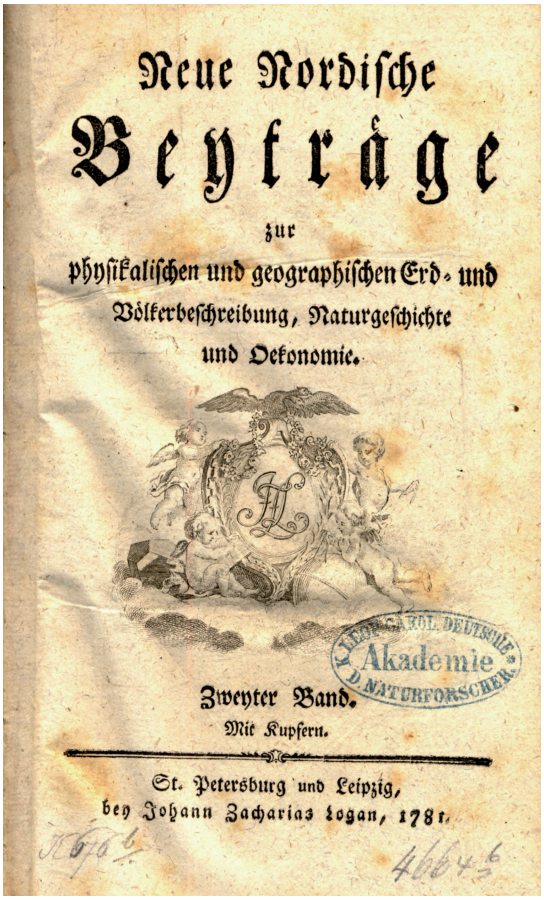
Johann Georg Gmelin (1709–1755) was born in Tübingen as a member of a respected family of doctors and apothecaries. At the age of 13 he started studying medicine and natural history at the University of Tübingen. After finishing his doctor´s thesis he joined his teacher Georg Bernhard Bilfinger (1693–1750), who had urged him to come to Russia. He arrived in St. Petersburg in 1727, and was given a chair as Professor of Chemistry and Natural History at the Academy. He was involved as one of the heads of the academic group in preparing the Second Kamchatka Expedition and given the task of carrying out scientific investigations. After his return from Siberia in 1743 he concentrated on evaluating the results of his botanical studies. In 1747 he returned to Tübingen, where he was Professor of Botany and Chemistry until his death. The results of his journey to Siberia are collected in his "Flora Sibirica" (1749–1769, 4 Vols.) and in his "Travels through Siberia from 1733 to 1743" (1751/52, 4 vols.)

In 1763 the Wild Ass was mentioned under the Chinese name "Yelotsee" (Wild mule) by the Jesuit J.B. DU HALDE. He praised the meat of this animal as tasty venison for the Mongolian Tartars.

Fig. 9a: Peter Simon PALLAS (1741-1811), student of the Alma mater halensis in 1758.

Fig 9b: Map of Dauria with the terra typica of *Equus hemionus hemionus* (from P.S. PALLAS: Reise durch verschiedene Provinzen des Russichen Reichs, Graz 1967).

Peter Simon PALLAS dissected at the end of May 1772 a three year old Wild Ass mare hunted in the surrounding of the Torej-nur (locality Kulusutai) in the Daurian steppe and gave in 1775 a detailed description of this type exemplar as ***Equus hemionus hemionus***. He wrote: "The picture dawn before the dissection was turned out so well that I was seldom more pleased with another drawing (than with it)". In the Latin text PALLAS (1775) calls the Wild Ass "*Equus hemionus*, mongolis dshikketaei dictus", in the German version 1781 "Dshiggetai". The term Dschiggetai is in Mongolia far-reaching unknown today. Nearly generally it is called "Chulan".


Neue Nordische
Beyträge
zur
physikalischen und geographischen Erd- und
Völkerbeschreibung, Naturgeschichte
und Oekonomie.
Zweyter Band.
Mit Kupfern.
St. Petersburg und Leipzig,
bey Johann Zacharias Logan, 1781.

I.
Naturgeschichte und Beschreibung
des
wilden Halbesels Dshiggetäi
in den
östlichen Wüsteneyen des mittlern Asiens a).
S. Platte 1.

Fig. 10: The publication of PALLAS with the description of *Equus hemionus hemionus*.

In the end of 1845 Régis-Évariste HUC was on the way between Kokonor and the springs of Yangtze river and gave a report on his observations on *Equus hemionus hemionus* (cit. in ZIMMER 2006):

"Wilde Maultiere sind im Äußeren Tibet ebenfalls sehr häufig. Seit dem Übergang über den Moron Us sahen wir fast jeden Tag einige. Dieses Tier, das unsere Naturforscher 'Hemionuspferd' nennen, ist ein Halbesel und hat die Größe eines gewöhnlichen Maultiers, aber einen schöneren Körperbau und anmutigere und viel aktivere Bewegungen; auf dem Rücken ist sein Haar rötlich und wird zum Bauch hin immer heller und

Fig. 11: Portrait of R.E. HUC (from ZIMMER 2006).

schließlich weiß. Der große und hässliche Kopf steht im Widerspruch zur Eleganz seines Körpers. Wenn es sich langsam bewegt, trägt es den Kopf hoch und hält die langen Ohren steif; im Galopp dreht es die Nase gegen den Wind und hebt den Schweif, der völlig dem des Maultiers gleicht. Sein Wiehern ist voll, hell und klangvoll, und es läuft so schnell, dass kein tibetischer oder tatarischer Reiter es einholen kann. Man muss sich in der Nähe ihrer Tränken in den Hinterhalt legen und mit Pfeilen oder Kugeln schießen. Das Fleisch ist vortrefflich, und aus der Haut werden Stiefel gemacht. Die Hemionuspferde sind fortpflanzungsfreudig, und ihre Jungen sind immer von derselben Art. Sie haben sich nie zähmen lassen. Wir haben von einzelnen Exemplaren gehört, die sehr jung gefangen und mit anderen Füllen aufgezogen wurden, aber nie wollte eines einen Reiter oder eine Last tragen. Bei der ersten Gelegenheit entfloh es in die Wildnis. Uns schien es aber gar nicht so wild: Wir sahen es beim Weiden mit den Pferden der Karawane herumtollen. Nur bei der Annäherung eines Menschen, den sie aus großer Entfernung sehen und wittern, ergreifen sie die Flucht".

Between 1855 and 1860 travelled Gustav RADDE (1862) around the southern East Siberia. On the plateaus of Altangana he found Wild Asses. He already reported on seasonal migrations and gave data on social and rutting behaviour. From the region of Soktui he brought four skulls into the Zoological Museum of St. Petersburg. His original reports give impressions also on hunting strategy and local customs of the inhabitants:

"Es scheint also wohl gewiss, dass das Hochland, welches wie auf unserer Karte als Plateau von Altangana bezeichneten seine höchsten Punkte zwischen den Grenzwachen Soktui und Abagaitui hat, das es sich südlich von hier aus allmählich zum Kürülün (Kerulen, Cherlen) und Buir-nor abflacht, dagegen nördlich durch das Onon-Borsaflüsschen und das Quelland des Gasimur begrenzt wird. In dieses Hochplateau begeben wir uns zur Herbstzeit, um die Lebensweise einer wilden Pferdeart kennen zu lernen, welche, aus der Gobi nordostwärts ziehend, hier noch ab und zu gefunden wird; es ist der unbändige *Dshiggetei* , sprichwörtlich bei den Mongolen seiner Schnelligkeit und Kraft wegen, **dasselbe Thier, welches in den Poesien der Kalchas-Mongolen besungen wird.** Die bedeutendsten Wanderungen des *Dshiggetei* nach NO finden im Herbste statt; die umherschweifende, unstäte Lebensweise dieses Thieres beginnt erst dann, wenn die Füllen vom letzten Sommer kräftig genug sind die anhaltenden, schnellen Märsche mitzumachen, und sich mit den Stuten, unter Leitung eines alten Hengstes, den Heerden anzuschließen. Um diese Zeit (also Ende September) trennen sich die jungen Hengste von den Tabunen, welchen sie bis ins 3. und 4. Jahr angehörten und ziehen einzeln in die bergigen Steppen, um sich selbst eine Heerde zu gründen, deren Leiter sie werden. Dann ist der *Dshiggetei* am unbändigsten. Stundenlang steht der junge Hengst auf der höchsten Spitze eines steinigen Gebirgsrückens, gegen den Wind gerichtet, die Rüstern breit geöffnet und weit hin über die niedrigere Landschaft blickend. Sein Auge durchirrt die

Fig. 11: Gustav RADDE (1831-1903).

Oede. Kampfgierig wartet er auf einen Gegner, dem er im gestreckten Galopp entgegensprengt. Jetzt entbrennt ein blutiger Kampf um die Stuten. Mit gehobenem Schweife jagt der Angreifende an dem Führer der Heerde vorbei und schlägt ihn im Laufe mit den Hinterfüssen. Die struppige Mähne hebt sich mehr aufrecht, dann, nach wenigen Sätzen hält er plötzlich an, wirft sich seitwärts und umkreist im weiten Bogen trabend die Heerde, deren Haupt er gierig ins Auge fasst. Aber der alte, wachsame Hengst wartet geduldig, bis sein frecher Feind ihm nahe genug ist; nun erst wirft er sich rasch auf ihn, beisst und schlägt wohin es auch immer treffen möge und nicht selten büsst einer oder der andere Kämpfer ein Stück Fell oder gar die Hälfte des glatten Kuhschweifes ein. Jedes der erlegten Thiere bewies durch die zahlreichen alten Narben, wie kampflustig diese schnellen Pferde sind. Ihre Kriege im Herbst benutzt der Tunguse um sie zu erlegen, ihr Fleisch ist ihm ein ihm ein Leckerbissen, ihr Fell bezahlen die Mongolen sehr gut und **besonders preisst die Haut des Schweifes mit dem langhaarigen Quast am Ende, denn nach dem Glauben der einfältigen Heiden liegt in diesem Theile eine wunderbare Heilkraft für kranke Thiere**. Die Mongolen glauben nämlich dass wenn sie ein Stückchen davon auf glühenden Kohlen verbrennen und das kranke Thier den Dampf davon einathme, es hiervon unfehlbar genese. Also das scheue Wild zu erlegen, zieht der Jäger am frühen Morgen mit seinem Pferde, welches eine hellgelbe Farbe haben muss, in die Gebirge südwestlich vom Soktui-Berg, woer die *Dshiggeteis* am häufigsten antrifft. Immer über Berg und Thal reitet er langsam durch die Einsamkeit, in welcher die Murmelthiere auf ihren Hügeln sich sonnen und die Adler hoch am Himmel kreisen. Ist die Höhe eines Gebirges erreicht, so schweift der Blick des weitsichtigen Jägers am fernen Horizont, ob nicht an ihm ein schwarzer Flecken das ersehnte Wild verräth. Er hat es bald erspäht. Jetzt rasch vorwärts, der Weg dorthin ist noch weit, man muss ihn noch verlängern, da nur in den Thälern und gegen den Wind geritten werden darf. Zu jener Höhe, von welcher der *Dshiggetei* nicht mehr fern, kriecht der erfahrene Jäger mit aller Vorsicht. Das Thier steht wie festgebannt, es blickt stier gegen Norden, nur noch ein Bergrücken trennt Jäger und Wild. Bald ist das diesseitige Thal zurückgelegt und nun beginnt die eigentliche Jagd. Dem raschen, gelben Klepper werden die losen Schweifhaare oben zusammengebunden, damit sie nicht im Winde hin und her fliegen und dann das Thier ohne Sattel auf die Höhe des Berges geleitet, wo es zu grasen beginnt. Der Jäger legt sich 20 -25 Faden von ihm entfernt platt auf den Boden, die Büchse ist fertig, sie ruht zum Abfeuern bereit auf der kurzen Gabel, deren sich die Schützen in Sibirien allgemein bedienen. So, in angestrengter Erwartung vergeht eine Viertelstunde. Der *Dshiggetei* bemerkt das Pferd, er hält es für eine Stute seines Geschlechts, er stürmt im Galopp auf das Thier zu, aber in seiner Nähe wird er stutzig, hält an und steht unbeweglich und nun ist der Augenblick zum Schusse günstig….Ausser dieser Art ihn zu erlegen gelingt es oftmals, trotz der Aufmerksamkeit und feinen Witterung dieses Thieres, es zu beschleichen, am vortheilhaftesten wählt man dazu einen stürmischen tag und wartet dann entweder an der Mündung eines Thals, in welchem der *Dshiggetei* grast und langsam dabei geht, bis er zu Schusse kommt, oder, er günstig hinter Anhöhen versteckt ist, kriecht man ihn an. Schon Pallas machte 1772 auf die vorzüglichen Eigenschaften dieses Thieres aufmerksam und regte dadurch dazu an Zähmungsversuche zu machen. In späteren Zeiten liessen es sich einige in Zuruchaitui und Nertschinski-Sawod lebende Beamte angelegen sein wiederholt zu versuchen junge *Dshiggetei*-Füllen aufzufuttern; aber stets blieben diese Versuche hier ohne Erfolge. Es ging damit wie in den donschen Steppen und am Asowschen Meere mit den sogenannten wilden Pferden. Die jungen Thiere gewöhnten sich zwar rasch an die Milch der Kühe und grasten auch, aber selten lebten sie länger als einen Monat in der Gefangenschaft. Erfolgreicher sind die Chinesen in dieser Hinsicht gewesen, denn wie die französischen Zeitungen berichten, so wurden durch das Consulat in Schangai mehrere zahme *Dshiggeteis* nach Paris geschickt, wo sie leben und sich vermehren“ (RADDE 1861).

“Die Jagden, welche ich in den Umgegenden nördlich vom grossen Dalai-nor im Sommer und Herbste 1856 veranstaltete, um in den Besitz mehrerer Dshiggeteis zu kommen, wurden durch gute Erfolge gekrönt und im Juni eine Stute, im October aber zwei andere Stuten und ein Hengst dieser wilden Thiere erlegt. Mit Leichtigkeit hätte ich im Herbst und Winter 1856 noch mehrere dieser Thiere erstehen können, da unter ihnen gerade der günstige Umstand starker Wanderungen gegen Norden Statt hatte, dem zu Folge sie sich zwischen dem Dalai- und Tarei-nor häufiger zeigten, als es in den letzten Jahren gemeinlich geschehen war…

Demgemäss reiste ich am 20. September zur alten Tschindantskischen Festung, in welcher einige Kosaken den Fischfang im Onon um diese Zeit betreiben. Von hier kehrte ich am 9. October nach Kulussutai mit meiner Beute zurück und machte dann noch eine Jagdparthie in die Kieferwaldung, welche sich von S’assutsche nach Kubuchai und westlicher hin streckt. Am 14. October von dieser Jagd heimgekehrt, begab ich mich dann am 16. October in die Grenzwacht Soktui und veranstaltete grosse Jagden auf Dshiggetei-Pferde und Antilopen, welche mich bis in die erste Woche des Novembers beschäftigten. Sodann verlies ich mit den erbeuteten Thieren diese Gegend und begab mich zurück in mein Hauptquartier nach Kulussutai, wo sie nebst manchen anderen, jetzt im Winter leicht zu beschaffenden Seltenheiten präparirt wurden…“(RADDE 1862).

For the 19th and the beginning of the 20th century were found data on the distribution of the Wild Ass in Mongolia in the notes of known explorers as REGEL (1881), PRZEWALSKIJ (1883), POTANIN (1883), PEVZOV (1883), NEMČINOV (1890) GRUMM-GRŽIMAILO (1891, 1914),

LADYGIN (1900), KAZNAKOV (1907), KOZLOV (1905, 1923) and others. In these times the Wild Asses were extraordinary numerous and distributed in all western and southern parts of the country. In the Northwest they were found up to the Chanchuchej Mountains and in the Northeast up to the Mongolian-Russian border-area.

M.V. PEVZOV N.G. POTANIN N.M. PRZEVALSKIJ

Fig. 12: Famous Russian explorers of Siberia and Central Asia in the 19th century.

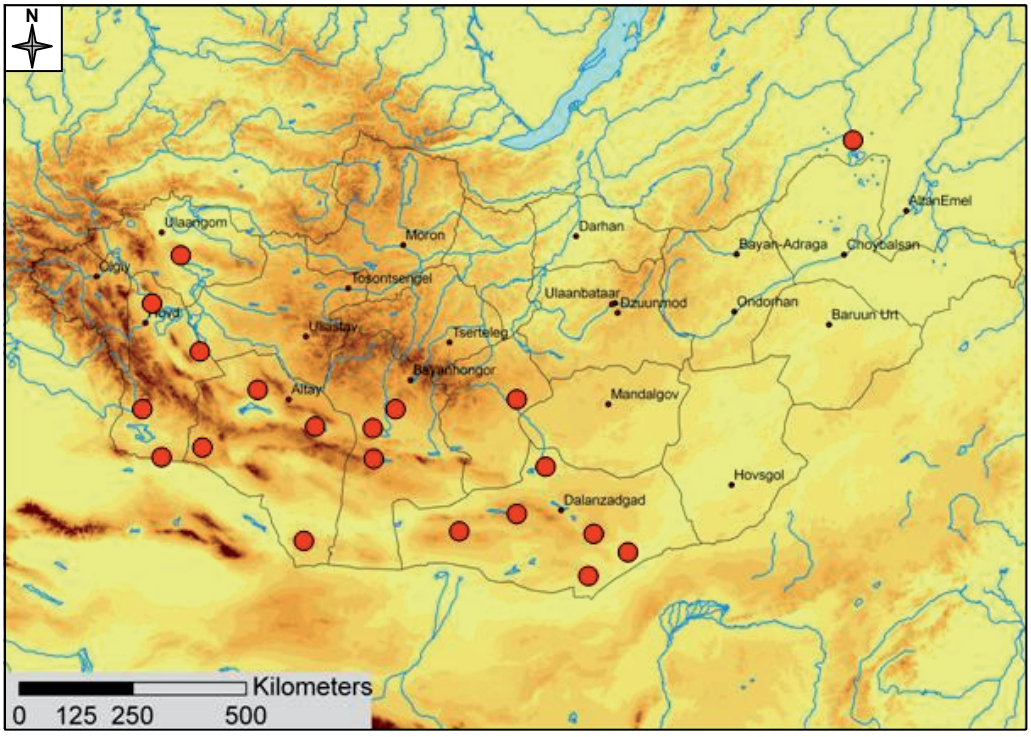


Fig. 12: Map with often from the Russian explorers mentioned localities of Wild Ass occurrence in the 19th and the beginning of the 20th century.

At the beginning of the 20th century some Wild Asses were brought by imports of Wild horses (HAGENBECK) from Mongolia to Europe. LYDEKKER (1904) described one of these animals from the surrounding of Chovd (Kobdo) or Chargas-nur[2] (Kirgis-nur) as *Equus onager castanaeus* and has drawn it (see SCHREIBER 2007).

MATSCHIE described 1911 the subspecies *Equus hemionus bedfordi* and *Equus hemionus luteus* from Western Gobi which are today as clear synonyms to repudiate (see also ELLERMAN & MORRISON-SCOTT 1966). The Central Asiatic area of *Equus hemionus* was one continuum, so that a taxonomic differentiation was not useful.

D. CARRUTHERS (1874) also met Dschiggetais. In the town Guchen he found a pelt (skin) on a bazaar. A few Kilometres northern he shot an animal and sometimes later another two not far from the Dzungarian Gate. In the 20ties (1921, 1923, 1925) Roy Chapman ANDREWS visited the Eastern Gobi. His findings of Saurian made him world-famous. His expedition also brought material of Wild Asses to the Natural History Museum of New York. He managed the first film documents on *Equus hemionus hemionus* and we thank him also a lot of biological data on this species. In those days ANDREWS found the first foals at the end of June.

G.E. GRUMM-GRŽIMAJLO P.K. KOZLOV R. CH. ANDREWS

Fig. 13: Famous explorers of Central Asia in the beginning of the 20th century.

At the end of the 19th and at the beginning of the 20th century the Wild Ass was a wide spread species in Mongolia not only in the southern Gobi but also more in the North between Mongolian and Gobi-Altaj and the southern foothills of the Changaj. The distribution has reached to the basin of the Great West Mongolian Lakes. Frequently mentioned localities of distribution were: the river Bulugun (Chovd), the mountain massif Adži-Bogdo; the lakes Chjargas-nur, Dureg-nur, Bon-Cagan-nur and Nogon-nur; the Šargyn-gobi, Chusejn-gobi; the Gurvan-Sajchan, the Nemegt Mountains, the areas around the Nojon-Bogdo, Ich-Bogdo, Bajtag-Bogdo, the lake Tacijn-Cagan-nur, the Tacijn-gol and others. The Wild Ass was a regular observed species in the semi-deserts between Kalgan and Urga (PEVZOV 1881). So it was still found in the 30ties of the 20th century in the area of Bajdraggol and Bon-Cagan-nur (SIMUKOV 1935, 1938; FORMOSOV 1929).

[2] Some remarks should permit to the writing of Mongolian geographic and author's name. We follow in our reports so far as possible the international transliteration; other colleagues are using English transactions. Therefore a lot of localities can't be found in atlases or maps. It's a terrible situation because you can find in one publication the same author or locality in three or more versions. The English transformation gives often not the original pronunciation. Therefore we recommend using only the international transliteration for better understanding in future.

Beginning in the year 1926 with the organization of the first Complex Biological Expeditions of the Mongolian Commission of the Academy of Sciences of the USSR led by A. KIRIČENCO, Soviet scientists took over the leadership in the investigation of the Dschiggetai in Mongolia. Between the results of these investigations the publications of BANNIKOV (1948, 1954) were of special importance. He was fascinated from the Dschiggetai and wrote a monograph on it in 1981. Also MURZAEV (1954) should be mentioned. He discovered old information sources on the Dschiggetai and reported on own observations. In 1941 he met in the Dale of the Lakes (at Bon-Cagan-nur) a herd of nearly 1000 Wild Asses.

Mongolian scientists of the Academy of Sciences in Ulan-Bator have investigated between 1959 and 1968 four animals: 1 ♂ from Belegich-bulak (Transaltaj-gobi), 06.10.1959; 2 ♂♂ from Cargin-usu/Tachin-šara-nuru, 22.09.1960; 1 ♀ from Majchan-bulak (Transaltaj-gobi), 01.10.1968. They determined the head-body-length with 236 cm, length of the tail with 47 cm and the length of the ears with 18.8 cm.

In the years 1943 and 1954 BANNIKOV (1954) found Wild Asses at the following localities: hilly landscape of Under-churen-charat (Transaltaj-gobi), Nogon-nur (eastern end of Serche-Barun-Sajryn chudag; south-western of Gurvan-Sajchan), Obotyn chural, Ingen-cejestejn-chudag, Cagan-Bogdo, Boomyn Chudag, Oasis Šara-Chulus, Atas-Bogdo, Majchan-Bulag, Dzachoj-Dzaram, Ederengijn-nuru, Cast-Ul, Chacar-usny-chudag, Cagan-gol, Legin-gol, Bulgan-Chošu, Gun-chudag, Bon-Cagan-nur, between Serche and Cagan-Olom. BANNIKOV could also include observations of JUNATOV and MUZAREV from the deserts southern from Dalanzadgad.

Fig. 14: A.G. BANNIKOV (1915 - 1985). Right: 30th jubilee of the University Ulan-Bator 1972, from left: M. Stubbe, N. Dawaa, A.G. Bannikov, A. Dašdorž, Cendsuren, K. Ulykpan, Y. Dash.

The first distribution map of the Wild Asses was represented by BANNIKOV (1948, 1954). He could describe the former northern distribution border in the central and south-eastern Mongolian steppes and published his ideas on the possible ways of area extension in the eastern steppes and western semi-deserts of Mongolia (see STUBBE et al. 2005).

Already 20 years after the findings of BANNIKOV the distribution area was decreased drastically to around 50 %. Then it covered approximately the following borders from West to East: in the western Gobi from the mountains Mergen-chamar-ul, Chaldzan-Burged-ul, Chonin-usny-Chooloj, Alak-nur, Elstu-Mjangan, Adš-Bogdo, Bur-nur; In the Transaltaj-gobi Bur-nur, Zachoj-Dzarmyn-gobi, southern foothills of Suman-Chajran, Zun-Modny-Šanda, Nogon-Cavyn-chooloj,

massif Chuver-ul, Gurvan-tes, Nojon Somon, Zulganaj-Zuramtaj, Mountains Nomgon, Church-ul and Galbyn-gobi.

In the 60s of the 20th century sometimes Wild Asses were registered on the territories of the somons Sulan-cher and Chatan-Bulak (East-Gobi-Aimag) and in the Šargyn-gobi (territory of the Šarga-somon, Gobialtaj-Aimag) (SHAGDARSUREN).

Therefore the Wild Asses were displaced from the steppe into the semi-desert and had withdrawn in the desert area in the South of the Mongolian and Gobi-Altaj. Corresponding to the relief DEMENTEV (1961) spoke on three characteristic zones: desert mountains, desert oases and desert plateaus.

For the Dschiggetais have the state of vegetation and the resources of water the decisive function. They are bound to the neighbourhood of oases and springs which were found commonly in the foothills of desert massifs and in the plains as the head water regions: Zun-Modny-Šand, Echin-gol, Sužin-bulak (Cagan-Bogdo), Belgechin-bulak, Toroin-bulak,Mjachan-bulak, Chajran-bulak, Toodgin-us, Tachin-us and others.

Around greater springs constantly are to found herds of Wild Asses or often their numerous footprints in the wet bottom. In the surrounding the Wild Asses are using the offered pastures. Between pasture and watering place clear visible trails are used by the animals.

In winter time the Wild Asses apparently are trying to find the neighbourhood Saxaul stocks because they are eating the young shoots so as in the foothills of Bajtag-Bogdo, Iche-Baga-Chavtag, Tachin Šara-nuru, Cheregijn-nuru, Naran-Sevestin-nuru and in other saxaul-woods in the southern Gobi.

In this respect our own observations confirm the remarks of BANNIKOV (1948, 1954) and GEPTNER (1948). Data on the nutrition of the Wild Asses are to found especially in the publication of BANNIKOV (1954). So he recorded that in July especially *Stipa gobica*, *Allium mongolicum, Anabasis brevifolia, Reaumuria soongorica* und *Lasiagrostis splendens* a mainly rule. In August in addition to the above named species were found *Halogeton glomeratus*, *Zygophyllum, Salsola*, *Ephedra przewalski*, *Allium polyrhizum* and others. After information of SIMUKOV (1927) the animals like to take also cultivated plants. In autumn the Dschiggetais are likely using *Stipa*-dwarf shrub-pastures and in rarer cases they were observed on *Salsola-Allium*-grounds.

A usually taken feeding plant of the Dschiggetais is *Zygophyllum xanthoxylon* (DENZAU & DENZAU 1999) because of its water content. That seems remarkable because *Zygophyllum* plants are toxic. After remarks of BANNIKOV (1954) Wild Asses are drinking once a day commonly. Also our observations have shown that the animals are to find in the evening or in the early morning at the watering places where they are staying for a more or less long time if there are now disturbances (domestic animals, enemies, strong wind, and blizzards). There are some detailed observations by DENZAU & DENZAU (1999).

At the south sides of mountain massifs and sand dunes the Wild Asses are staying for some hours especially during blizzards or at cold sunny days as observed by us at Ulan-Bajšingin-us (Tachin-Šara-nuru) and in the Elchonskoj-gobi.

At daytime Wild Asses are nearly not to found at watering places or in the shadow of the high steep walls of sajrs. Wild Asses are very active animals. Daily and seasonal migrations are characteristically for them. Over the whole day they are slowly moving and grazing over the pastures, at night they are resting (BANNIKOV 1954). Often, especially in spring was observed that the animals also are resting during daytime apparently in doze in standing position. Repeatedly we could observe Wild Asses rolling on the bottom (dust bath) and take photos from rolling places.

Information about the number of Wild Asses in Mongolia are very contradictory. Partly in earlier literature was reported on big (great) herds. KASAKEVIČ (1927) had observed a herd of 500 to 600 animals in the area of Tost-ul. ANDREWS (1933) met herds up to 1000 Dschiggetais in the basin of Cagan-nur. Today such will be met very seldom or better said nearly not in Mongolia. BANNIKOV (1958) registered a population density of 1 Wild Ass on 50 to 30 km^2 that corresponded with a number of 6,000 - 7,000 animals for the Western and Transaltaj-gobi. It seems that in comparison to the 50ties the number of Dschiggetais had clearly decreased. In the years 1959, 1960, 1961 were met not more than 15-20 animals at a rout of 100 km on places with good feeding conditions. In spring 1967 SHAGDARSUREN registered from Bajtag-Bogdo to Chajrchan-Bulak (eastern border of Tachin-Šara-nuru Mountains) on an area of 2,400 km^2 (only) 128 Dschiggetais. Also in the eastern part of their area the number of Wild Asses was decreasing evidently. In 1959 from Nogon-Cavyn-chooloj up to Cagan-Bogdo over 200km only 18 Wild Asses could be noticed.

SHAGDARSUREN numbered the stock of Wild Asses in the 60ties with not more than 2,500 - 3,000 animals. He observed "herds" (groups) of 6 till 11 animals only, mostly consisting of a stallion and 3 - 4 mares with some few foals. He saw also groups of 5 - 6 "bachelors". In autumn (September/October) these groups join to bigger associations (herds). At 1st of October 1960 was registered a herd of around 100 animals in the surrounding of the spring Otgon-Bulak (Transaltaj-gobi) and at 14th of October 1961 in the area of Nuc-us (western Gobi) another group of 38 Wild Asses. In spring these formations are diminishing again.

DASHDORJ (1964), professor for zoology at the University Ulan-Bator, reported on the occurrence of Wild Asses up to in the Dornogobi-Aimag and numbered several thousand animals. The regular frequency (occurrence) of Wild Asses in the eastern Gobi was confirmed by ZEVEGMID & DAWAA (1973) and it continues up to now (STUBBE et al. 2005). Also today observations of several hundred animals are possible.

Fig. 15: A group of Wild Asses in the South Gobi (photo: M. STUBBE, 2004).

ZHIRNOV & ILYNSKY (1986) laid the foundation for the Gobi National Park A (Transaltaj) and B (Dzungarian Gobi). They have determined for these areas a stock of 800 (A) respectively 1,500 (B) Wild Asses. That means a population density of 0.02 respectively 0.17 animals/km^2. Feeding resources in these areas including 12 - 15 plant species (ZHIRNOV & ILYNSKY 1986). The authors also referred to losses of Wild Asses by wolves. That is confirmed by information of FEH et al. (1994) and STUBBE et al. (2005).

In 1975/76 SOKOLOV & ORLOV visited the National Park Gobi B and referred a stock of around 750 animals. FEH et al. (1994) published some data on social structure which were analyzed critically by DENZAU & DENZAU (1999). WANG & SCHALLER (1996) were in 1994 in the south-western Gobi and have publicized a distribution map of the Dschiggetai in Mongolia and China. For the Mongolian territory eastern of the degree of longitude of Dalanzadgad had MIX et al. (1995) specified a density of 0.19 - 0.31 animals/km^2, that means a total number (projection) of 15,000 -25,000 (may be also 40,000) animals. Their evaluation shows that 89 % of the Dschiggetais are staying in the south-eastern Gobi.

On the territory of China GUOZHONG et al. (1985) have registered in the Kalamaili-reserve a stock density of 0.02 exemplares/km^2 and GAO & GU (1989) for the whole Chinese stock a value of 0.03 exemplares/km^2 But the stock consist of not more than 2000 animals. In Inner Mongolia there are no more than 250 animals (WANG & SCHALLER 1996).

More actual information on state and distribution of the Dschiggetai in Mongolia are published by READING et al. (2001). They have done a census of 33,000 to 63.000 animals by projection of different registration methods in different years and seasons. So these data are to scrutinize because they seem to be not very sure. The authors determined a density from 4.2 up to 19.1 Wild Asses/100 km^2.

Fig. 16: Quo vadis Dschiggetai (*Equus hemionus hemionus*) in Central Asia ? (photo: M. STUBBE, 2004).

Fig. 17: What will be the future of this Dschiggetai foal ? (photo: M. STUBBE).

DENZAU & DENZAU (1999) have employed intensively with the territorial system (behaviour) of Dschiggetais. Mare-foal-groups could distinguish clearly from bachelor-groups and territorial stallions. The "crying songs" of stallions were described impressively. At the end of June 1996 still were found pregnant mares, copulations were documented by impressing photographs. At a watering place (Tsagan Tolgai), at a rutting area stallions have acquired short-time-territories for a few hours. On size and number of territories as well as on local and time stability of them in greater Wild Ass concentrations is known nothing. DENZAU & DENZAU (1999) assume a system described by CLUTON-BROCK (1989) as "Clustered Mating-Territories", where stallions are building up territories in the rutting time which are visited by the mares. Our previous observations are supporting these statements strongly. Further intensive analyzes are urgently necessary.

Craniological data on Mongolian Wild Asses are included in the investigations of GRAY (1849), MATSCHIE (1883, 1911) SALENSKY (1902), OSBORN (1912), MOTOHASHI (1930), POCOCK (1948), ORLOV (1961), GROVES (1963, 1974), GROVES & MAZAK (1967), GROVES & WILLOUGHBY (1981), EISENMANN (1986) and others. UERPMANN (1990), EISENMANN & BECKOUCHE (1986) and EISENMANN & MASHKOUR (2000) have given remarks on the importance of the extremity skeleton for osteological-taxonomical orientated investigations. More details are summarized by SCHREIBER (2007), who analyzed all sources of collected materials in the museums around the world and their taxonomic value.

The importance of the Wild Asses for the biocoenosis includes that in dry years these animals enable other animals (birds, mammals) to get (reach) water by opening of ground water with their hoofs. In snowy winters the Wild Asses gave by their activities other species the possibility to reach food. As commercial used species the Wild Ass doesn't play an actual rule. Hunting of it is forbidden. Still illegal persecution (STUBBE et al. 2005) is increasing considerably. The venison is considered to be an esteemed food resource. At the other hand (side) the argument that the Wild Ass must be killed (hunted) because it exerts concurrence pressure to the domestic animals comes to the fore. But this line of reasoning counteracts with the high international reputation of the nature conservation in Mongolia.

References

ANDREWS, R.C. (1927): Auf der Fährte des Urmenschen. - Leipzig.

ANDREWS, R.C. (1933): The Mongolian wild Ass. - Nat. Hist. No. **38**: 3-16.

BANNIKOV, A.G. (1948): Geografičeskoe rasprostranenie i zametki po biologii kulana v Mongolii. - Zool. Žurnal (Moscow) **27** (1): 65-74.

BANNIKOV, A.G. (1954): Mlekopitajuščie MNR. - Moskva.

BANNIKOV, A.G. (1958): Materialy po faune i biologii amfibii i reptilii. - Bull. Mosc. Soc. Nat., biol. Ser. **63** (2): 71-97.

BANNIKOV, A.G. (1981): Kulan. - Moskau (Russisch).

CARRUTHERS, D. (1914): Unknown Mongolia. - London, Vol. **2** (2nd ed.).

CLUTTON-BROCK, T.H. (1989): Mammalian Mating Systems. - Proc. Royl. Soc. London B **236**: 339-372.

DASHDORJ, A. (1964): Communication on the Current Survival in Mongolia of the Wild Horse, Wild Camel and Wild Ass. - Proc. Zool. Soc. London **144**: 425-428.

DEMENT'EV, G.P. (1961): Mlekopitajuščie Zaaltajskoj Gobi (MNR). - Pervoe vsesojuz. soveščpo mlekopitajuščim.- Moskva, p. 41.

DENZAU, G.; DENZAU, M. (1999): Wildesel. - Stuttgart.

DUNCAN, P. (ed.) (1992): Zebras, Asses and Horses, an Action Plan for the Conservation of Wild Equids. - IUCN/SSC Equid Specialist Group, Gland.

EISENMANN, V. (1986): Comparative Osteology of Modern and Fossil Horses, Halfasses and Asses. - In: MEADOW, R.; UERPMANN, H.-P. (Eds.): 67-116.

EISENMANN, V.; BECKOUCHE, S. (1986): Identification and Discrimination of Metapodials from Pleistocene and Modern Equids, Wild and Domestic. - In: MEADOW, R.; UERPMANN, H.-P. (Eds.): Equids in the Ancient World, Beihefte zum Tübinger Atlas des Vorderen Orients, Reihe A, Nr. 19/1: 117-163.

EISENMANN, V.; MASHKOUR, M. (2000): Data base for teeth and limb bones of modern hemiones. - Fiches d´ostéologie animale pour l´archéologie, Paris.

ELLERMAN, J.R.; MORRISON-SCOTT, T.C.S. (1966): Checklist of Palaearctic and Indian Mammals 1958 to 1946. - 2nd ed., London.

FEH, C.; BOLDSUKH, T.; TOURENQ, C. (1994): Are Family Groups in Equids a Response to Cooperative Hunting by Predators; The Case of Mongolian Kulans (*Equus hemionus luteus* Matschie). - Rev. Ecol. (Terre Vie) **49**: 11-20.

FORMOZOV, A.N. (1929): Mlekopitajuščie severnoj Mongolii po sboram ekspedicii 1926 goda. Predvaritelnoj otčjot zoologičeskoj ekspedicii v severnuju Mongoliju.- Leningrad.

GEPTNER, V.G. (1948): Kulan i perspektivy ego suščestvovanija v SSSR. - Ochrana prirody, Nr. 2.

GMELIN, J.G. (1752): Reise durch Sibirien. - Bd. 2, Göttingen.

GRAY, J.E. (1849): Notes on the Skull of *Equus hemionus* and *Equus kiang*. - Proc. Zool. Soc. London, 29-30.

GROVES, C.P. (1963): Results of a Multivariate Analysis on the Skulls of Asiatic Wild Asses, with a Note on the Status of *Microhippus hemionus blanfordi* Pocock. - Annales and Magazine of Natural Historie, Ser. 13, **6**: 329-336.

GROVES, C.P. (1974): Horses, Asses and Zebras in the Wild. - Newton Abbot.

GROVES, C.P.; MAZAK, V. (1967): On some Taxonomic Problems of Asiatic Wild Asses; with the Description of a New Subspecies. - Z. Säugetierk. **32**: 321-355.

GROVES, C.P.; WILLOUGHBY, D.P. (1981): Studies on the Taxonomy and Phylogeny of the Genus *Equus*, 1. Subgeneric Classification of the Recent Species. - Mammalia **45**: 321-354.

GRUM-GRIJIMAILO (1891): Expedition of the Brothers Grijimailo to the Tian Shan Oases and Lob-nor, Summary of a Journey. - Proc. Royal Geogr. Soc. **13**: 208-226, 1 map.

GRUMM-GRŽIMAJLO, G.E. (1914): Zapadnaja Mongilija i Urjanchajskij kraj. - T. **1**.

GUOZHONG, C.; CHONGQI, L.; YUNQIU, R.; WEI, W.; YUNQIU, H. (1985): The Summer Habitat and Population Numbers of the Mongolian Wild Ass in the Kalamaili Mountains Wildlife Reserve, Xingjiang Uygur Autonomous Region. - Acta Zool. Sinica **31** (2): 178-186 (Chinese).

HENZE, D. (1983): Enzyklopaedie der Entdecker und Erforscher der Erde. - Bd. II, Graz.

HERBST, H. (1925): Der Bericht des Franziskaners Wilhelm von Rubruk über seine Reise in das Innere Asiens in den Jahren 1253-1255. - Leipzig.

HUC, R.E. (1855): Reise durch die Mongolei nach Tibet und China 1844-1846. - Leipzig (Neuauflage Frankfurt/Main 1986).

IAKINF-BIČURIN (1828): Zapiski o Mongolii. - č. I-II.

KAZNAKOV, A.M. (1907): Moi puti po Mongolii i kamy "Mongolija i Kam". - T. II, vyp. 1, Moskva.

KOZLOV, P.K. (1905): Mongolija i Kam. - T. 1, Moskva.

KOZLOV, P.K. (1923): Mongolija i Amdo i mertvyi gorod Chara-choto. - Moskva.

LADYGIN, V.F. (1900): Poezka na verchovja reki Bulugun (Urungu). - Izv. RGO **36**.

LADYGIN, V.F. (1900): O peresečenii Gobi ot Dalan-Turu v Sučžou. - Izv. RGO **36**.

LYDEKKER, R. (1904): Note on the Wild Ass of Mongolia. - Proc. Zool. Soc. London **1**: 431-432.

MATSCHIE, P. (1893): Bemerkungen über Asiatische Wildesel. - Sitzungsber. Ges. Naturforschender Freunde Berlin: 206-208.

MATSCHIE, P. (1911): Über einige von Herrn Dr. Holderer in der südlichen Gobi und in Tibet gesammelte Säugetiere. - In: FUTTERER, K. (Hg.): Durch Asien, Vol. **3**: 1-29, Nachtrag.

MESSERSCHMIDT, D.G. (1724): Tagebuchaufzeichnungen, veröffentlicht 1962-1968 als „Forschungsreise durch Sibirien 1720-1727". - Bd. **3** (1966), Berlin.

MIX, H.; READING, R.P.; LCHAGVASUREN, B. (1995): A systematic census of various large mammals in Eastern and Southern Mongolia. - Proc. Conf. on Asian Ecosystems and their Protection (August 1995), Ulaanbaatar (in Russian).

NEMČIKOV, I. (1890): Ot Kalgana do Chobdo. - Trudy russkich torgovych ljudej v Mongolii i Kitae. - Zap. vost. sibirskogo otdel. RGO **1** (1).

NOWGORODOWA, E. (1980): Alte Kunst der Mongolei. - Leipzig.

ORLOV, V.N. (1961): Age Variability of the Skull in *Equus hemionus* Pall. - Zoologičeskij Žurnal **40**: 592-601 (Russia).

OSBORN, H.F. (1912): Craniometry of the Equidae, - Memoirs of the American Museum of Nat. Hist. NS **1** (3): 57-100.

PALLAS, P.S. (1775): *Equus hemionus*, Mongolis Dshikketaei dictus. - Novi Commentarii Academiae Scientiarum Imperalis Petropolitanae **19**: 394-417.

PALLAS, P.S. (1781): Naturgeschichte und Beschreibung des wilden Halbesels Dshiggetai in den östlichen Wüsteneyen des mittleren Asiens. - Neue Nordische Beyträge **2**: 1-21.

PEVZOV, M.V. (1881): Otčjot ob ekspedicii 1878 g. v Mongolii. - Izv. RGO **16** (5).

PEVZOV, M.V. (1883): Očerk putešestoija po Mongolii. - Zap. Sib. Otd. RGO **V**.

POCOCK, R.I. (1948): Comments on some Races of the Asiatic Wild Asses (*Microhippus*) with a Description of the Skull of the Chigetai. - Proc. Zool. Soc. London **117**: 764-767.

POTANIN, G.N. (1881-1883): Očerki severozapadnoj Mongolii. - Vyp.1-3, Moskva.

PRŽEVALSKIJ, N.M. (1875-1876): Mongolija i strana tungutov. - T. I-II, Moskva.

PRŽEVALSKIJ, N.M. (1883): Iz Zajsana čerez chami v Tibet i verchovja želtoj reki. - Moskva.

RADDE, G. (1861): Berichte über Reisen im Süden von Ost-Sibirien. – Beiträge zur Kenntnis des Russischen Reiches und der angrenzenden Länder Asiens, Bd. **23,** St. Petersburg.

RADDE, G. (1862): Reisen im Süden von Ost-Sibirien in den Jahren 1855 - 1859. - Vol. **1**: Die Säugetierfauna, St. Petersburg.

READING, R.P.; MIX, H.M.; LCHAGVASUREN, B.; FEH, C.; KHANE, D.P.; DULAMTSUREN, S.; ENKHBOLD, S. (2001): Status and distribution of Khulan (*Equus hemionus*) in Mongolia. - J. Zool. London **254**: 381-389.

REGEL, A. (1881): Meine Expedition nach Turfan, 1879. - Petermanns Geogr. Mitt. **27**: 380-394.

SALENSKY, W. (1902): Wissenschaftliche Resultate der von N.M. Przewalski nach Central-Asien unternommenen Reisen. - Bd. **1**, Mammalia, Abt. 2 Ungulata, Lieferung 1: Equus Przewalskij, St. Petersburg.

SHAGDARSUREN, O.; JIGI, S.; TSENDJAV, D.; DULAMTSEREN, S.; BOLD, A.; MUNKH-BAYAR, KH.; DULMAA, A.; ERDENJAV, G.; ULZIKHUTAG, KH.; LIGAA, V.; SANCHIR, C. (1987): Red Book of the Mongolian Peopl´s Republic. - Ulaanbaatar.

SIMUKOV, A.D. (1935): Južno-Gobiskij Aimak. - Sovremennaja Mongolija Nr. 1 (8).

SIMUKOV, A.D. (1937/38): Po pustynjam zapadnoj Gobi. - Sovremennaja Mongolija Nr. 6 (25) 1937 i Nr. 1 (26) 1938.

SIMUKOV, A.D. (1938): Putevye zametki po Changaju i Gobi zimoj 1937 goda. - Sovremennaja Mongolija Nr. 2 (27).

SOKOLOV, V.E.; ORLOV, V.N. (1980): Key to the Mammals of the Mongolian Peoples Republic. - Moscow (Russisch).

STUBBE, A.; STUBBE, M.; BATSAJCHAN, N.; SAMJAA, R.; DORŽDEREM, S. (2005): First results of Wild Ass research in the South Gobi Aymag/Mongolia in 2003 and 2004. - Erforsch. biol. Ress. Mongolei (Halle/Saale) **9**: 107-120.

WANG, X.; SCHALLER, G.B. (1996): Status of large Mammals in Western Inner Mongolia, China. - Journal East China Normal Univers, (Special Issue on Zoology) **12**: 93-104.

WINTER, E.; USCHMANN, G.; JAROSCH, G. (Hrsg.)(1966): D. G. MESSERSCHMIDT. Forschungsreise durch Sibirien 1720 - 1727. - Teil 3, Berlin.

ZEVEGMID, D.; DAWAA, N. (1973): Die seltenen Großsäuger der Mongolischen Volksrepublik. - Arch. Natursch. u. Landschaftsforsch. **13**: 87-106.

ZHIRNOV, L.V.; ILYINSKY, V.O. (1986): The Great Gobi National Park. - Moscow.

ZIMMER, D.E. (2006): Nabokov reist im Traum in das Innere Asiens. - Reinbek.

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