

# Camelids & Plague

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## Contents

<b>BIBLIOGRAPHIES</b> .....	2	1910.....	35
<b>LINGUISTICS</b> .....	4	1920.....	40
<b>BIOARCHAEOLOGY •</b>		1940.....	41
<b>DOMESTICATION • GENETICS</b> .....	8	1950.....	41
<b>GENERAL WORKS • HISTORY •</b>		1960.....	42
<b>CULTURE</b> .....	21	1970.....	47
<b>MEDIEVAL DUNHUANG</b>		1980.....	48
<b>MANUSCRIPTS</b> .....	30	1990.....	50
<b>CAMEL PLAGUE • PESTIS</b>		2000.....	50
<b>CAMELORUM • CHUMA</b>		2010.....	51
<b>VERBLYUDOV</b> .....	35	<b>HISTORICAL VETERINARY</b>	
1870.....	35	<b>MEDICINE • ETHNOVETERINARY</b>	
1890.....	35	<b>MEDICINE</b> .....	59
		<b>VETERINARY MEDICINE (20TH C.</b>	
		<b>ONWARDS)</b> .....	62

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(ILCA Monograph 5)  
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[(bibliographic review, *Camelus dromedarius*)  
Abstract: A vailable literature on the dromedary in Africa and Asia is reviewed in order to assess the current performance and productive potential ofthis species. The origins, distribution and classification of camel breeds are briefly discussed. The reproductive anatomy is described, and is followed by an account of breeding behaviour and performance, with special attention to fertility. The digestive anatomy of the dromedary and itsfeed and water requirements are then analysed, with a discussion of water metabolism, before the animal's major and minor diseases are identified. The camel's ability to produce milk and meat is assessed in detail, together with its suitability for transport and other purposes, such as ploughing, milling and the production of hides and skins. Management and socio-economic factors are also briefly discussed. Finally, the information presented is summarized, some proposals for future research are put forward, and a bibliography is given.]
- (4) \*°1985 [pdf] *Le chameau (Camelus dromedarius): Étude bibliographique.*  
(CIPEA Monographie 5)  
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[(bibliographic review, *Camelus dromedarius*) French version of (3) MUKASA-MUGERWA 1981.  
Abstract: A vailable literature on the dromedary in Africa and Asia is reviewed in order to assess the current performance and productive potential ofthis species. The origins, distribution and classification of camel breeds are briefly discussed. The reproductive anatomy is described, and is followed by an account of breeding behaviour and performance, with special attention to fertility. The digestive anatomy of the dromedary and itsfeed and water requirements are then analysed, with a discussion of water metabolism, before the animal's major and minor diseases are identified. The camel's ability to produce milk and meat is assessed in detail, together with its suitability for transport and other purposes, such as ploughing, milling and the production of hides and skins. Management and socio-economic factors are also briefly discussed. Finally, the information presented is summarized, some proposals for future research are put forward, and a bibliography is given.]
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## Linguistics

Chinese: • *luòtuó*, *luò-tuó* 駱駝 < EMC *lak-da* ‘camel’; Japanese: *rakuda*

• *luò-tuó* 駝駝 < EMC *l-ak d-a* [駝駝: 上郎各反。下唐羅反。]



A. «*Su wu yao ming lin*» 俗務要名林 S. 617, (XX-SKQS #0236: 361, S.617/7).

B. «*Su wu yao ming lin*» 俗務要名林 P. 2609, col. 94 *za chu bu* 雜畜部.

C. «*Long kan shou jian*» 龍龕手鑑 j. 2.10: 43b, 45b [駝:正。駝:今。音陟 *tuó* < EMC *da*。駝 | 也。二。], [駝:正。駝:通。皆落 *luò* < EMC *lak* 託 *tuō* < EMC *tʰak* 二音。 | 駝也。下又知格反 *zhé* < EMC *t-ɛ:jk*。 | 駝 *zhé-mò*。]

D. YANG Xiong 揚雄 «*Fang yan*» 方言 7.49f.30: 「擻、贅、賀、躄，僮也。齊楚陳宋之間曰擻。燕之外郊、越之垂甌、吳之外鄙謂之贅，南楚或謂之擻。自關而西隴冀以往謂之賀，凡以驢馬駝駝載物者謂之負他，亦謂之賀。」

• *tuó-tuó* 橐駝 < EMC *tʰak-da* ‘camel’ («*Shi jù*»)

• *tuō-tuó* 拖駝 < EMC *tʰa-da* ‘camel’

• *tuó-tuó* 馱駝 < EMC *da-da* ‘camel’

(8) HAMMER-PURGSTALL Joseph von [Dr., Freiherr, 1774-1856]

\*°1854 [pdf]

*Das Kāmel.*

(Aus dem VI. Bande der Denkschriften der philos. histor. Classe der K. Akademie der Wissenschaften besonders abgedruckt.)

Wien: Kaiserlich-Königliche Hof- und Staatsdruckerei. [84p.]

<<https://download.digitale-sammlungen.de/pdf/1507144796bsb10231436.pdf>>

[(erschliessung der arab. wörterbuchquellen; ca. 6000 lexeme; linguistic contribution to veterinary science)

30-32: 71) *Krankheiten des Kameles*. 31-32: “Pestbeule ist es, wie die Beule des Kameles, / Und der Tod harret auch im Haus der Selúlitin.” (‘Aámir/‘Ámir)]

(9) \*°1856 [pdf]

*Das Kāmel.* (Schluss) *Lexicalische Belege.*

in: Denkschriften der Kaiserlichen Akademie der Wissenschaften.

Philosophisch-historische Classe 7: 1-104.

<<https://archive.org/details/denkschriften0708ster>>

[64-69: XLIX. *Von den Krankheiten des Kameles*: a) des Kopfes; b) Lungenkrankheiten; c) Brustkrankheiten; d) Rücken und Höcker; e) Krankheiten des Schenkels, der Achseln, des Euters, des Bauches, des Fusses und des Hufes. (camel plague)

67f: (camel plague expressions)

aus Heimweh kranke sich darnach schneude Kamel, 4190) قرعد (4191) قرع das mit Pestbeulen behaftete, 4192) مغد (4193) مغوده (4194) غاد, Plural 4195) غداد (4196) غدايد von der Wurzel 4197) غد das Kamel litt an Pestbeulen, 4198) داری das an Beulen leidende Kamel, 4199) غدة die Pestbeule, 4200) سواف Todeskrankheit des Kameles, 4201) ممت (Plural 4202) ماويت die ihr Junges verloren hat, 4203) جارن Kamelpest, Seuche welcher dieselben allgemein erliegen; Burkhardt selbst führt solche Seuche als Ausnahme an, was dadurch bestätigt wird, dass Dseharif kein Synonym hat, denn die Wurzel 4204) جرف heisst: er hat den Kamelen von dem Kraute Dseherf gegeben was vermuthlich den Kamelen schädlich.

67:

sonst 4151) خرط (4152) خارط das damit behaftete Kamel, 4153) نطف heisst zwar gewöhnlich das Kamel litt an wunden Rücken oder an einer Pestbeule, aber auch der Zustand des Kameles, wenn die Rückenwunde sich bis zum Bauche erstreckt, 4154) نطوفة dieser Zustand'), 4155) كنع das Kamel hatte 4156) كتوع

- (10) MENGES K.  
1935 *Die Wörter für "Kamel" und einige seiner Kreuzungsformen im Türkischen*,  
in: Ungarische Jahrbücher 15: 517-528.  
[(animal names) L: Turkish; 'camel'.]
- (11) REDARD G.  
1964 *Camelina. Notes de dialectologie iranienne II*,  
in: *Indo-Iranica. Mélanges présentés à Georg Morgenstierne à l'occasion de son soixante-dixième anniversaire*. Wiesbaden, pp. 155-162.
- (12) CONRAD Lawrence I.  
°1982 [pdf] *Tā'ūn and Wabā' Conceptions of Plague and Pestilence in Early Islam*,  
in: *Journal of the Economic and Social History of the Orient* 25(3):  
268-307. <<http://www.jstor.org/stable/3632188>>  
[(disease names: L. Arabic) (a) *tā'ūn*, pl. *tawā'īn* 'bubonic plague (due to corrupted air)' (of 'to pierce, strike') = Syriac *šar'ūtā*, Gk. *boubōn*; (b) *wabā'* (Gk. *loimós*) 'pestilence (due to corrupted environment)'.  
298-301: "Our oldest and most important evidence on the identity of the *tā'ūn* involves an extremely old Arabic proverb which appears in several contexts comparing the *tā'ūn* to the *ghudda*, a deadly disease of camels characterized by swellings similar to those of bubonic plague. In one set of reports, 'Amir ibn al-Tufayl, a great poet and chieftain of the Banū Ša'ša'a, comes to the Prophet and asks what his reward will be if he embraces Islam. Upon finding that he can expect no special privileges, he threatens Muhammad and leaves with his men. The Prophet appeals for divine assistance, and as 'Amir is on his way home to his own territory, God causes him to be stricken "in the neck by the *tā'ūn*". With his tongue lolling out of his mouth from the agony, 'Amir staggers into the house of a woman from the Banū Salūl, a clan scorned by the other bedouin tribes as vile and despicable. Seeing that he is not even to be granted a respectable place to die, he bitterly utters a phrase that was to become proverbial for two simultaneous disasters, one even worse than the other: "A *ghudda* like that of the house of a Salūlī woman" <sup>110</sup>). The historical accuracy of course be called into question, but what interests us here is the fact that the association of deadly swellings in the neck with the *tā'ūn* was so commonly known that at a very early date it could become the basis for a proverbial account widely reported in some of the oldest of our surviving Arabic sources <sup>111</sup>). / The proverb appears again within the context of a revealing group of traditions that also seem to have arisen in Umayyad times. In one, the Prophet assures his followers, "My community will not perish, save through the *ta'n* (war wounds) and the the *tā'ūn*". When asked what the *tā'ūn* is, he replies, "A *ghudda* like that of the camel; the one stricken by it is like a martyr and fleeing from it is like fleeing from the inexorable advance of an army" <sup>112</sup>). In another tradition, the great *tā'ūn* of 'Amwās in 18/639 is interpreted as the fulfillment of a prophecy in which Muḥammad warns the Muslims that one day they will conquer Syria and settle in a place where they will be stricken by "a disease like the *ghudda* of the camel" <sup>113</sup>). Later authorities express the relationship in terms even more explicit: "the *ghudda* in camels is like the *tā'ūn* in man" <sup>114</sup>). / As our sources seem quite comfortable with this simile, we would clearly be on firmer ground if we knew more about the symptoms—obviously the basis for the compari-

son—that were associated with the affliction of a camel by the ghudda. Al-Aṣmā’i provides such information in his *Kiṭāb al-ibḷ*, a lexicographical work discussing in detail the copious Arabic terminology concerning camels. In the chapter on diseases of camels <sup>115</sup>), we read that the ghudda “strikes in the groin, and in the genitals, axillae, and throat. When it strikes in the groin, one can see it protruding clearly”. There then follows a long list of epithets applied to camels suffering from various forms of ghudda: for example, what the beast is called if the swelling erupts in the lymph glands under the back of the jaw, or if the swelling suppurates and heals <sup>116</sup>). / Al-Aṣmā’i additionally describes forms of the ghudda that do not appear to be directly associated with actual swellings or tumors. He maintains that if the ghudda strikes the heart of the camel it will kill the animal in short order, and describes forms of the disease characterized by gasping and increasingly violent fits of coughing. / Some of these descriptions of the disease are exact parallels to the classic symptoms of bubonic plague in man. On others we cannot be so certain, but overall, the correspondence of the ghudda to the plague is so close that it suggests the possibility that the affliction of the heart, quickly followed by death, and the fits of gasping and coughing, were included as forms of ghudda since they seemed so similar to pneumonic plague in man <sup>117</sup>). If this hypothesis—and for the time being it remains nothing more than that—can be confirmed, it would be of the greatest significance, since pneumonic plague is highly contagious and is fatal in practically all untreated cases <sup>118</sup>).”]

(13) SIYAD Isse Mohamed

°1984 [pdf]

*A Semantic Field: The Camel,*

in: LABAHN Thomas (ed.) 1984: *Proceedings of the Second International Congress of Somali Studies. University of Hamburg, August 1-6, 1983. Volume I: Linguistics and Literature.* Hamburg: Helmut Buske, pp. 287-298.

[(animal names) L: Somali; semantic field ‘camel’.

- Naming: stages of development, age; reproduction; transport.
- Physical aspect: colours.
- Anatomy: parts of the body; disease. – plague *not* mentioned.
- Behaviour: movement; sexual functions.
- Interaction: how the camel talks; how to talk to the camel.
- Songs: affection to the camel; importance of the camel; camels are difficult to rear; camels cause quarrels; for load camels.]

(14) INGHAM Bruce

°1990

*Camel Terminology among the Āl Murrah Bedouins,*

in: *Zeitschrift für Arabische Linguistik* 22: 67-78.

<<http://www.jstor.org/stable/43615799>>

[(animal terms; camel terms)

L: Arabic dialect of Āl Murrah, Eastern Arabia (Saudi Arabia, Qatar).

terms for ages; she-camels; colour classification; description in poetry; function and origin. – Note: No disease terms included.]

(15) MESERVE Ruth I.

°1996 [pdf]

*The Terminology for the Diseases of Domestic Animals in Traditional Mongolian Veterinary Medicine,*

in: *Acta Orientalia Academiae Scientiarum Hungaricae* 49(3):

335-358. <<http://www.jstor.org/stable/43391296>>

[(traditional Mongolian veterinary medicine)

345: “56. ГУБРУТУ- ~ ГУБРУТА- (Chakhar): camel plague; treated by breaking the cartilage in the nose, filling the throat with scratching insects and pouring a mixture of fish soup, spirits, and butter through its nose [MONG 62, 14r-15r; for a variant see MORL..., 8v-9r], Compare ГУБРУУ: camel plague; treated by cutting out the cartilage of the nose; or, by making it drink the blood of a gazelle [Shag. 132]; ≈ ГУВРУУ (Khalkha): camel plague; ГУВРУУТАХ-: to contract camel plague [Hangin 129; Tsevel 155].”

349: “78. МОМО, МОМОРО- (Oirat): Siberian plague; anthrax; to die of the plague [K. III 603-604].”

338 n. “T = gamma in Classical Mongol; it has been maintained in Khalkha for back vowel transliterated as G in front vowel words.”

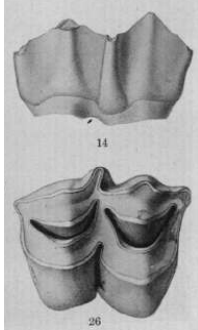
Hangin = Hangin, Gombojab, with John R. Krueger-Paul D. Buell-William V. Rozycki-Robert G. Service, *A Modern Mongolian-English Dictionary*. Bloomington 1986. (Uralic and Altaic Series 150.)

K. = Krueger, John R., *Materials for an Oirat-Mongolian to English Citation Dictionary*. Vol. I-III. Bloomington, 1978-1984.

MONG. 62 = *MORI TEMEGE-Ü EBEDCIN-I ĴASAQU ARĴ-A ANU*. Katalogsignatur MONG. 62, Royal Library, Copenhagen, Manuscript.  
 MORI... = *MORI MAL-ÜN BERTEGSEN ĴERGE-YIN EBEDCIN-I TANIQU Ba. ĴASAQU-YIN ARĴ-A-YI ÖCÜKEN ÜGÜLEGSEN ANU*. Oriental Collection, Russian Academy of Sciences (St. Petersburg); microfilm copy Research Institute for Inner Asian Studies, Indiana University (Bloomington, Indiana). Manuscript.  
 Shag. = Shagdarsürüng [Chagdarsürüng], Ts[evel]. [Šagdarsürèn, Cèvèl], *L'art vétérinaire des mongols nomades*. *Studia Mongolica* (Ulaanbaatar) 8:9 (1980) 125-137.  
 Tsevel = Tsevel, Ya., *Mongol xelnü товс tailbar tol'*. Ulaanbaatar 1966.]

- (16) WIEBUSCH Thekla & TADMOR Uri  
 °2009 22. *Loanwords in Mandarin Chinese*.  
 in: HASPELMATH Martin, TADMOR Uri (eds.) °2009 [pdf] *Loanwords in the World's Languages. A Comparative Handbook*. Berlin: de Gruyter Mouton, pp. 575-598.  
 [583-584: "(...) 骆驼 *tuotuo* 'camel' (originally 橐它, 拖駝, 馱駝 *tuotuo*, borrowed during the Han Dynasty from Xiongnu *dada* 'camel')." (no reference given)]
- (17) EADES Domenyk, WATSON Janet C.E., AL-MAHRI Mohammed Ahmad  
 °2013 [pdf] *Camel Culture and Camel Terminology Among the Omani Bedouin*,  
 in: *Journal of Semitic Studies* 58(1): 169-186.  
<https://doi.org/10.1093/jss/fgs044>  
<http://isamveri.org/pdfdkm/04/DKM040399.pdf> (scan)  
 [(animal terms; camel terms; Oman, Bedouins)  
 L: Arabic (Šarqiyya region, northern Oman); Mehri (Dhofar, southern Oman).  
 Terms for stages of life; partonyms; camel trappings; gaits; actions and vices; types, colours and fur types; varia. – Note: No disease terms included. –  
 Abstract: Traditionally a defining aspect of Bedouin culture, the role of the camel among the Omani Bedouin has diminished significantly due to rapid modernization throughout the country. The very rich camel culture of the Bedouin of Oman is reflected most obviously in their terminology for camel husbandry, made famous in classical Arabic poetry and prose; one manifestation of the reduced significance of the camel today is a diminishing awareness of the complexity of camel terminology among the young Omani Bedouin. This paper examines aspects of camel husbandry among two Bedouin communities which are distinguished geographically and linguistically within Oman: a Mehri-speaking community of the Dhofar region in the south of the country and an Arabic-speaking community of the Šarqiyya region in the north, and then considers a taxonomy of camel terminology. The study found a paucity of lexical borrowing between the two communities with respect to camel terminology, reflecting the fact that camel husbandry has ancient roots within the cultures of each community. The paper is based on ongoing documentation of traditional camel culture among the southern Arabian Bedouin, and represents an attempt both to show the intricacy of camel husbandry terminology and to produce an initial taxonomy of terms. ]

## Bioarchaeology • Domestication • Genetics

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1869 *Studien zur Geschichte der Haustiere I. Das Kameel,*  
in: Zeitschrift für Ethnologie 1: 66-79, 232-251, 353-363.
- (19) LEHMANN Otto  
1891 *Das Kamel, seine geographische Verbreitung und die Bedingungen seines Vorkommens,*  
in: Zeitschrift für wissenschaftliche Geographie 8: 93-141.
- (20) LESBRE François-Xavier  
°1900 [pdf] *Recherches anatomiques sur les camélidés. Anatomie du chameau à deux bosses. Différences entre les deux espèces de chameaux. Différences entre les chameaux et les lamas.*  
Lyon: Henri Georg.  
[195p.; Extrait des *Archives du Muséum d'Histoire naturelle de Lyon*, Tome VIII.]  
<<http://www.biusante.parisdescartes.fr/histmed/medica/cote?extalfo00098>>  
[[Camelid anatomy]]
- (21) SCHLOSSER Max [1834-1932]  
°1903 [pdf] *Die fossilen Säugethiere Chinas nebst einer Odontographie der recenten Antilopen.*  
Mit 14 Tafeln und 32 Textfiguren.  
Aus den Abhandlungen der k. bayer. Akademie der Wiss. II. Cl. XXII.  
Bd. I. Abth.  
München: Verlag der k. Akademie; in Commission des G.  
Franz'schen Verlags (J. Roth).  
[221p., [27] Bl.; ill.] BSB Sig.: 4 Lith. 151 b  
URN: urn:nbn:de:bvb:12-bsb00069488-3  
<<http://nbn-resolving.de/urn/resolver.pl?urn=urn:nbn:de:bvb:12-bsb00069488-3>>  
[(fossil mammal *Paracamelus gigas* Schlosser 1903)  
95-97: "Artiodactyla selenodonta. Tylopoda. / *Paracamelus gigas*. n. g. n. sp.  
Taf. IX, Fig. 14, 26.]
- 
- Fig. 14. *Paracamelus gigas* n. sp. oberer rechter M<sub>1</sub> von aussen, röhliche Sande, Idem Fig. 26. p. 95.  
Fig. 26. *Paracamelus gigas* n. g. n. sp. oberer rechter M<sub>1</sub> von unten, röthl. Sande. Idem Fig. 14, p. 95.]
- (22) ZDANSKY Otto [1894-1988]  
1926 *Paracamelus gigas* Schlosser,  
in: Palaeontologia Sinica, Ser. C • Zhongguo gushengwu zhi 中國古生物誌, bing zhong 丙種 2(4): 1-44. (Peking)

[Plates I-IV and 23 figures of text. Text in German; added t.p. and summary in Chinese; summary paged with Chinese numerals. Each plate accompanied by guard sheet with descriptive letterpress.]

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\*<sup>o</sup>1951 [pdf] *Zum Problem des Zeitpunkts der Domestikation der altweltlichen Cameliden*,  
in: Zeitschrift der Deutschen Morgenländischen Gesellschaft 101  
(n.F. 26): 29-51. <<http://www.jstor.org/stable/43368789>>
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in: Zeitschrift der Deutschen Morgenländischen Gesellschaft 104(1)  
(n.F. 29): 45-87. <<http://www.jstor.org/stable/43368917>>
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in: Ethnologica 2: 190-204.
- (26) GAUTIER A.  
1966 *Camelus thomasi from the northern Sudan and its bearing on the relationship C. thomasi-C. bactrianus*,  
in: Journal of Paleontology 40: 1368-1372.
- (27) COMPAGNONI B., TOSI Maurizio  
1978 *The camel: its distribution and state of domestication in the Middle East during the third millennium BC in light of the finds from Shahr-i Sokhta*,  
in: MEADOW R.H. & ZEDER Melinda A. (eds.) 1978: *Approaches to Faunal Analysis in the Middle East*. Peabody Museum of Archaeology and Ethnology, Bulletin 2: 119-128, New Haven, CT.
- (28) GRIGSON Caroline  
\*<sup>o</sup>1983 [pdf] *A very large camel from the upper Pleistocene of the Negev Desert*,  
in: Journal of Archaeological Science 10(4): 311-316, 1 fig., 2 tables.  
<[https://doi.org/10.1016/0305-4403\(83\)90068-7](https://doi.org/10.1016/0305-4403(83)90068-7)>  
[(fossil camels, Negev desert)  
Abstract: Bones of an Upper Pleistocene *Camelus* have been found in the northwestern Negev, they are of particular interest because they are larger than those of all the Old World camel species since the Plio-Pleistocene, and they are very much larger than the few fossil camels already known from the Middle East. It is suggested that they represent the only *C. thomasi* yet identified outside Africa.]
- (29) \*2012 *Camels, copper and donkeys in the early Iron Age of the southern Levant: Timna revisited*,  
in: Levant 44(1): 82-100.  
<<https://doi.org/10.1179/175638012x13285409187919>>
- (30) \*2014 *The history of the camel bone dating project*,  
in: Anthropozoologica 49: 225-235.
- (31) MEADOW R.H.  
1984 *A camel skeleton from Wheeler's excavations at Mohenjo-Daro*,  
in: LAL B.B. & GUPTA S.P. (eds.) 1984: *Frontiers of the Indus Civilization: A Sir Mortimer Wheeler commemoration volume*. New Delhi: Books and Books, pp. 137-140.



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[Abstract: Camel-based pastoral societies make an archaeological appearance at the center of the Near East towards the end of the second millennium. Advantageous for long-distance trade and desert warfare, the camel also opened up vast expanses of desert to human exploitation. The diverse cultural traditions of contemporary camel keepers illuminate the domestication and utilization of this estimable beast.]
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[Abstract: The ability of camels to walk and carry heavy loads for long distances in arid regions is well recognized. However, the metabolic requirement in walking and load carrying is unknown. The objective of this study was to measure the  $O_2$  used by man and camel walking side by side on a well-packed road. Three men ( $\bar{X}$  80 kg) and six camels ( $\bar{X}$  583 kg) were used. The camels were part of a feral herd which freely roams in the central Australian desert. The  $\bar{V}O_2$  was measured while man and camel walked together, the camel setting the pace, without load and with a load amounting to 21%-34% of body weight. Resting  $\bar{V}O_2$  of camels sitting quietly on the ground was 21 % lower than values predicted from the mouse-to-elephant equation. Upon standing,  $\bar{V}O_2$  increased 11%. The energy cost of walking at 67 m/min without a load was significantly greater in man than in camel. The energy cost of walking increased, although not statistically significantly, only 18% when camels carried an average load equal to 28% of their body weight. In conclusion, the camel's lower resting  $\bar{V}O_2$  and cost of walking, and the associated economy in heat production and in food and water requirements, contribute to explaining its superior adapt-ability and support its epithet, "ship of the desert."]
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to some important issues of systematics, evolutionary history, paleoecology, taphonomy, and  
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[Abstract: *Paracamelus* cf. *aguirrei* from Çobanpınar (Turkey) is described. Rodents from that locality suggest a Late Turolian or Latest Miocene age, indicating that this is one of the oldest records of the genus. *Paracamelus* dispersed from North America in a relatively short period during the Late Turolian (MN13) into the extensive open and dry environments from central Asia to North Africa, as well as into southern Spain. –

117: “1. Introduction / Camelidae originated in the Eocene of North America, where they became first diverse in the Neogene, later they declined and finally went extinct. However, before going extinct there, they dispersed toward two areas where they still live today. They dispersed into the Old World during the Latest Miocene and, during the Late Pliocene Great American Exchange, they entered South America, where they are still represented by wild vicuña and guanaco and domestic llama and alpaca. The earliest Old World camels placed in *Paracamelus* are descendants of the North American *Procamelus* or *Megacamelus*, and ultimately gave rise to the living bactrian camel (*Camelus bactrianus*) and the domestic dromedary (*C. dromedarius*).”

122: “4. Conclusion / *Paracamelus* from Çobanpınar is one of the oldest camels of the Old World. Other early *Paracamelus* are found in the Latest Miocene (MN13 or equivalent) localities of Librilla and Venta del Moro in Spain, Yushe Basin in China and Jalalabad, Afghanistan. Several Pliocene localities in Eurasia and North Africa also yielded remains of *Paracamelus*. The dispersal of camels into the Old World seems to have occurred after 6.3 Ma and before 5.8 Ma, possibly during a time of intensive faunal exchange between the different continents. The limits of the distribution of Talpa, Tapirus, Anchitherium, cervids and some other mammals suggest the presence of arid or dry environments in the Middle East, inhibiting their dispersal into Africa and the Indian Subcontinent during most of the Mio-Pliocene [24]. All Miocene camel localities are within the present-day arid belt that extends from North Africa (and southern Spain) to central Asia, and again suggest that some dry environments existed during the Late Miocene and that *Paracamelus* was adapted to them.”]

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[Abstract: The evidence of camel hybridization—principally the crossing of Bactrian males and Arabian or dromedary females—is discussed against the backdrop of osteological evidence for the distribution of the Bactrian’s wild progenitor, *Camelus ferus*. Historical and ethnographic evidence attesting to the widespread practice of hybridization, from Central Asia in the east to Anatolia in the west, is presented. The origins of camel hybridization are pushed back into the early 1st millennium B.C. and evidence for the presence of Bactrian camels in areas outside of its natural habitat is discussed in light of the advantages of hybridization. Keywords: camels, hybridization, Assyria, Iran, Near East.]
- (52) \*°2005 [pdf] *Bactrian Camels and Bactrian-Dromedary Hybrids*, in: *Silk Road* 3(1): 49-58, 2 figs.  
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2007 *A complete mitochondrial genome sequence of the wild two-humped camel (Camelus bactrianus ferus): an evolutionary history of camelidae,*  
in: BMC Genomics 8: 241. doi: 10.1186/1471-2164-8-241.  
<<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1939714/>>  
[Abstract: Background: The family Camelidae that evolved in North America during the Eocene survived with two distinct tribes, Camelini and Lamini. To investigate the evolutionary relationship between them and to further understand the evolutionary history of this family, we determined the complete mitochondrial genome sequence of the wild two-humped camel (*Camelus bactrianus ferus*), the only wild survivor of the Old World camel.  
Results: The mitochondrial genome sequence (16,680 bp) from *C. bactrianus ferus* contains 13 protein-coding, two rRNA, and 22 tRNA genes as well as a typical control region; this basic structure is shared by all metazoan mitochondrial genomes. Its protein-coding region exhibits codon usage common to all mammals and possesses the three cryptic stop codons shared by all vertebrates. *C. bactrianus ferus* together with the rest of mammalian species do not share a triplet nucleotide insertion (GCC) that encodes a proline residue found only in the nd1 gene of the New World camelid *Lama pacos*. This lineage-specific insertion in the *L. pacos* mtDNA occurred after the split between the Old and New World camelids suggests that it may have functional implication since a proline insertion in a protein backbone usually alters protein conformation significantly, and nd1 gene has not been seen as polymorphic as the rest of ND family genes among camelids. Our phylogenetic study based on complete mitochondrial genomes excluding the control region suggested that the divergence of the two tribes may occur in the early Miocene; it is much earlier than what was deduced from the fossil record (11 million years). An evolutionary history reconstructed for the family Camelidae based on cytb sequences suggested that the split of bactrian camel and dromedary may have occurred in North America before the tribe Camelini migrated from North America to Asia.  
Conclusion: Molecular clock analysis of complete mitochondrial genomes from *C. bactrianus ferus* and *L. pacos* suggested that the two tribes diverged from their common ancestor about 25 million years ago, much earlier than what was predicted based on fossil records.]
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Lyon: Maison de l'Orient et de la Méditerranée Jean Pouilloux,

pp. 487-497, 7 figs.

[http://www.persee.fr/doc/mom\\_1955-4982\\_2008\\_act\\_49\\_1\\_2720](http://www.persee.fr/doc/mom_1955-4982_2008_act_49_1_2720)

[Abstract: This paper presents results obtained from a huge assemblage of camel bones unearthed during archaeological excavations at Al Sufouh 2, Dubai, UAE. Based on the geological investigations carried out around the ancient site, the radiocarbon dates obtained, and the morphology, age structure and size of the camel bones, the site represents a hunting and butchering site for wild dromedaries which was in use during the Umm an-Nar and Wadi Suq potters periods (second half of the 3rd millennium to first half of the 2nd millennium BC). The material offers the largest number of measurable bones of wild dromedary known until now. Keywords: South-east Arabia, Dubai, United Arab Emirates, wild dromedaries, hunting practices, domestication., Sud-Est de l'Arabie, Dubai, Émirats Arabes Unis, dromadaires sauvages, pratiques de chasse, domestication.

Plan: Introduction / State of preservation and species identification of the camel bones / Dating / Bone size / Age classes and sex distribution / Ancient environment / Discussion / Final conclusions / Bibliography.]

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*Prehistoric camels in south-eastern Arabia: the discovery of a new site in Abu Dhabi's Western Region, United Arab Emirates,*

in: Proceedings of the Seminar for Arabian Studies 39: 17-30, 9 figs.

<http://www-users.york.ac.uk/~mjb117/pdf/Beech-et-al-2009-camel.pdf>

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[Abstract: A remarkable new site consisting of a concentration of as many as forty or more camel skeletons has been discovered in Abu Dhabi's Western Region in the United Arab Emirates. Eight camel bone samples (from six individuals) from the site have been AMS radiocarbon dated by the Leibniz Laboratory for Radiometric Dating and Stable Isotope Research, Kiel University, Germany, revealing that they date from the second half of the fifth millennium BC. The site is located in an interdunal area to the south-east of the Baynunah Plantation, not far from the Ruwais-Habshan pipeline. The spread of camel bones extends over an area of about 10,000 m<sup>2</sup>. Preliminary analysis of the bones suggests that they are from wild dromedaries. Other archaeological finds associated with the camel bones include a finely made flint arrowhead. This important newly discovered site will provide a valuable opportunity to examine a large sample of wild camel bones during the later prehistory of south-eastern Arabia. Future detailed investigations at the site will throw fresh light on the early interactions between the communities inhabiting late prehistoric Arabia and the camel.]

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2009

*Monophyletic origin of domestic Bactrian camel (Camelus bactrianus) and its evolutionary relationship with the extant wild camel (Camelus bactrianus ferus),*

in: Animal Genetics 40(4): 377-382, 2 figs., 1 table, suppl. information.

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[Abstract: The evolutionary relationship between the domestic bactrian camel and the extant wild two-humped camel and the factual origin of the domestic bactrian camel remain elusive. We determined the sequence of mitochondrial cytb gene from 21 camel samples, including 18 domestic camels (three *Camelus bactrianus xinjiang*, three *Camelus bactrianus sunite*, three *Camelus bactrianus alashan*, three *Camelus bactrianus red*, three *Camelus bactrianus brown* and three *Camelus bactrianus normal*) and three wild camels (*Camelus bactrianus ferus*). Our phylogenetic analyses revealed that the extant wild two-humped camel may not share a common ancestor with the domestic bactrian camel and they are not the same subspecies at least in their maternal origins. Molecular clock analysis based on complete mitochondrial genome sequences indicated that the sub-speciation of the two lineages had begun in the early Pleistocene, about 0.7 million years ago. According to the archaeological dating of the earliest known two-humped camel domestication (5000–6000 years ago), we could conclude that the extant wild camel is a separate lineage but not the direct progenitor of the domestic bactrian camel. Further phylogenetic analysis suggested that the bactrian camel appeared monophyletic in evolutionary origin and that the domestic bactrian camel could originate from a single wild population. The data presented here show how conservation strategies should be implemented to protect the critically endangered wild camel, as it is the last extant form of the wild tribe Camelina.

Keywords: bactrian camel, domestication, mitochondrial genome, phylogeny.]

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2014 *Genetic diversity and population structure of Mongolian domestic Bactrian camels (Camelus bactrianus)*,  
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°2014 [pdf] *The camel remains from site HD-6 (Ra's al-Hadd, Sultanate of Oman): an opportunity for a critical review of dromedary findings in eastern Arabia*,  
in: *Anthropozoologica* 49(2): 207-224, 10 figs., 1 table.  
<<http://dx.doi.org/10.5252/az2014n2a04>>  
<<http://sciencepress.mnhn.fr/sites/default/files/articles/pdf/az2014n2a04.pdf>>  
[Abstract: Bone remains of camel (*Camelus dromedarius*) have been found in several sites of south-eastern Arabia, dating from the Late Holocene period to the Bronze Age, and generally attributed to wild animals. The new camel finds from the Early Bronze Age site of Ra's al-Hadd (HD-6) – dated with radiocarbon technique between 2890-2580 BC – are the oldest camel evidence in the Sultanate of Oman. This discovery represents an opportunity for a critical review of all available data in the Arabian Peninsula. These remains are important because [they] widen our knowledge about camel spreading trajectory and raise an obvious question about its domestication or wild status. This study contributes to the debate about camel status and the relationship between late prehistoric communities and this animal.  
Keywords: Camel, domestication, Bronze Age, Sultanate of Oman.]
- (62) WU Huiguang, GUANG Xuanmin, AL-FAGEEH Mohamed B., CAO Junwei, PAN Shengkai, ZHOU Huanmin, ZHANG Li, ABUTARBOUSH Mohammed H., XING Yanping, XIE Zhiyuan, ALSHANQEETI Ali S., ZHANG Yanru, YAO Qjulin, AL-SHOMRANI Badr M., ZHANG Dong, LI Jiang, MANEE Manee M., YANG Zili, YANG Linfeng, LIU Yiyi, ZHANG Jilin, ALTAMMAMI Musaad A., WANG Shenyuan, YU Lili, ZHANG Wenbin, LIU Sanyang, BA La, LIU Chunxia, YANG Xukui, MENG Fanhua, WANG Shaowei, LI Lu, LI Erli, LI Xueqiong, WU Kaifeng, ZHANG Shu, WANG Junyi, YIN Ye, YANG Huanming, AL-SWAILEM Abdulaziz M. & WANG Jun  
°2014 [2 pdf] *Camelid genomes reveal evolution and adaptation to desert environments*,  
in: *Nature Communications* 5: art. no. 5188 [9p., 4 figs, 1 table]  
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Supplementary Figures 1-27, Supplementary Tables 1-52, Supplementary Method and Supplementary References [108p.]. Supp. Data 1-20 [excel files]  
<<https://www.nature.com/articles/ncomms6188.pdf>>  
[Abstract: Bactrian camel (*Camelus bactrianus*), dromedary (*Camelus dromedarius*) and alpaca (*Vicugna pacos*) are economically important livestock. Although the Bactrian camel and dromedary are large, typically arid-desert-adapted mammals, alpacas are adapted to plateaus. Here we present high-quality genome sequences of these three species. Our analysis reveals the demographic history of these species since the Tortonian Stage of the Miocene and uncovers a striking correlation between large fluctuations in population size and geological time boundaries. Comparative genomic analysis reveals complex features related to desert adaptations, including fat and water metabolism, stress responses to heat, aridity, intense ultraviolet radiation and choking dust. Transcriptomic analysis of Bactrian camels further reveals unique osmoregulation, osmoprotection and compensatory mechanisms for water reservation underpinned by high blood glucose levels. We hypothesize that these physiological mechanisms represent kidney evolutionary adaptations to the desert environment. This study advances our understanding of camelid evolution and the adaptation of camels to arid-desert environments.  
• Erratum: “In this Article Junyi Wang is incorrectly listed as one of several equally contributing authors. The correct list of equally contributing authors is: Huiguang Wu, Xuanmin Guang, Mohamed B. Al-Fageeh, Junwei Cao, Shengkai Pan and Huanmin Zhou.”]
- (63) FAYE Bernard  
°2015 [pdf] *Role, distribution and perspective of camel breeding in the third millennium economies*, (review article)  
in: *Emirates Journal of Food and Agriculture* 27(4): 318-327, 8 figs.  
<<http://dx.doi.org/10.9755/ejfa.v27i4.19906>>



[Abstract: Although, it is occupying quantitatively a marginal place among the domestic herbivorous (0.4% only of the world domestic herbivorous), the large camelids (dromedary and Bactrian) are present in almost all the arid lands of the old world (except in Southern Africa), being wide spreading over 35 million km<sup>2</sup>. They are overall remarkable valorizers of these spaces by their productive potential and by their role in the agro-ecosystemic balance of the arid lands, especially with the current climatic changes. Elsewhere, they are known for their physiological peculiarities linked to their adaptation ability to harsh conditions of the desert and of its margin. In consequence, they represent a fabulous biological model for the scientists from different disciplines. Their place in the “modern world” has to be re-evaluated by considering these trends and these particularities. Key words: Camel, Climatic changes, Economy, Sustainability.]

- (64) FITAK Robert R., MOHANDESAN Elmira, CORANDER Jukka, BURGER Pamela A.  
2015 *The de novo genome assembly and annotation of a female domestic dromedary of North African origin*,  
in: Molecular Ecology Resources 16: 314-324, supporting information.  
<<http://europepmc.org/abstract/MED/26178449>>  
[Abstract: The single-humped dromedary (*Camelus dromedarius*) is the most numerous and widespread of domestic camel species and is a significant source of meat, milk, wool, transportation and sport for millions of people. Dromedaries are particularly well adapted to hot, desert conditions and harbour a variety of biological and physiological characteristics with evolutionary, economic and medical importance. To understand the genetic basis of these traits, an extensive resource of genomic variation is required. In this study, we assembled at 65 × coverage, a 2.06 Gb draft genome of a female dromedary whose ancestry can be traced to an isolated population from the Canary Islands. We annotated 21 167 protein-coding genes and estimated ~33.7% of the genome to be repetitive. A comparison with the recently published draft genome of an Arabian dromedary resulted in 1.91 Gb of aligned sequence with a divergence of 0.095%. An evaluation of our genome with the reference revealed that our assembly contains more error-free bases (91.2%) and fewer scaffolding errors. We identified ~1.4 million single-nucleotide polymorphisms with a mean density of 0.71 × 10<sup>-3</sup> per base. An analysis of demographic history indicated that changes in effective population size corresponded with recent glacial epochs. Our *de novo* assembly provides a useful resource of genomic variation for future studies of the camel's adaptations to arid environments and economically important traits. Furthermore, these results suggest that draft genome assemblies constructed with only two differently sized sequencing libraries can be comparable to those sequenced using additional library sizes, highlighting that additional resources might be better placed in technologies alternative to short-read sequencing to physically anchor scaffolds to genome maps. Keywords: adaptation, *Camelus dromedarius*, demography, domestication, next-generation sequencing ]
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2015 *When was the dromedary domesticated in the ancient Near East?*  
in: Zeitschrift für Orient-Archaeologie 8: 253-278.
- (66) ALMATHEN Faisal, CHARRUAU Pauline, MOHANDESAN Elmira, MWACHARO Joram M., OROZCO-TERWENGEL Pablo, PITT Daniel, ABDUSSAMAD Abdussamad M., UERPMANN Margarethe, UERPMANN Hans-Peter, DE CUPERE Bea, MAGEE Peter, ALNAQEEB Majed A., SALIM Bashir, RAZIQ Abdul, DESSIE Tadelle, ABDELHADI Omer M., BANABAZI Mohammad H., AL-EKNAH Marzook, WALZER Chris, FAYE Bernard, HOFREITER Michael, PETERS Joris, HANOTTE Olivier & BURGER Pamela A.  
°2016 [pdf] *Ancient and modern DNA reveal dynamics of domestication and cross-continental dispersal of the dromedary*,  
in: PNAS 113(24): 6707-6712, 3 figs., supplemental information [43p., text, fig. S1-S12, tables S1-S13; Dataset S01 (XLSX)].  
<<http://www.pnas.org/cgi/doi/10.1073/pnas.1519508113>>  
<<http://www.pnas.org/lookup/suppl/doi:10.1073/pnas.1519508113/-/DCSupplemental>>  
<<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4914195/>>  
[(paleogenetics of dromedary)]

Abstract: Dromedaries have been fundamental to the development of human societies in arid landscapes and for long-distance trade across hostile hot terrains for 3,000 y. Today they continue to be an important livestock resource in marginal agro-ecological zones. However, the history of dromedary domestication and the influence of ancient trading networks on their genetic structure have remained elusive. We combined ancient DNA sequences of wild and early-domesticated dromedary samples from arid regions with nuclear microsatellite and mitochondrial genotype information from 1,083 extant animals collected across the species' range. We observe little phylogeographic signal in the modern population, indicative of extensive gene flow and virtually affecting all regions except East Africa, where dromedary populations have remained relatively isolated. In agreement with archaeological findings, we identify wild dromedaries from the southeast Arabian Peninsula among the founders of the domestic dromedary gene pool. Approximate Bayesian computations further support the "restocking from the wild" hypothesis, with an initial domestication followed by introgression from individuals from wild, now-extinct populations. Compared with other livestock, which show a long history of gene flow with their wild ancestors, we find a high initial diversity relative to the native distribution of the wild ancestor on the Arabian Peninsula and to the brief coexistence of early-domesticated and wild individuals. This study also demonstrates the potential to retrieve ancient DNA sequences from osseous remains excavated in hot and dry desert environments. Keywords: anthropogenic admixture | *Camelus dromedarius* | demographic history | paleogenetics | wild dromedary.

Significance: The dromedary is one of the largest domesticates, sustainably used in arid and hostile environments. It provides food and transport to millions of people in marginal agricultural areas. We show how important long-distance and back-and-forth movements in ancient caravan routes shaped the species' genetic diversity. Using a global sample set and ancient mitochondrial DNA analyses, we describe the population structure in modern dromedaries and their wild extinct ancestors. Phylogenetic analyses of ancient and modern dromedaries suggest a history of restocking from wild animals from the southeast coast of the Arabian Peninsula. Dromedaries now extend the list of species for which classic models of domestication from a single center and from wild conspecific individuals in isolation are rejected.]

discussion:

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<<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4914171/>>
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- BURGER Pamela A. PETERS Joris, MAGEE Peter & HANOTTE Olivier 2016: *Reply to Marom et al.: Mitochondrial panmixia in dromedaries predates ancient caravan trading*, in: PNAS 113(32): E4583-E4584. (Reply)  
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2016

*The history of Old World camelids in the light of molecular genetics*,  
in: Tropical Animal Health and Production 48: 905-913, 3 figs.  
doi: 10.1007/s11250-016-1032-7.

<<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4884201/>>

[Abstract: Old World camels have come into the focus as sustainable livestock species, unique in their morphological and physiological characteristics and capable of providing vital products even under extreme environmental conditions. The evolutionary history of dromedary and Bactrian camels traces back to the middle Eocene (around 40 million years ago, mya), when the ancestors of *Camelus* emerged on the North American continent. While the genetic status of the two domestic species has long been established, the wild two-humped camel has only recently been recognized as a separate species, *Camelus ferus*, based on molecular genetic data. The demographic history established from genome drafts of Old World camels shows the independent development of the three species over the last 100,000 years with severe bottlenecks occurring during the last glacial period and in the recent past. Ongoing studies involve the immune system, relevant production traits, and the global population structure and domestication of Old World camels. Based on the now available whole genome drafts, specific metabolic pathways have been described shedding new light on the camels' ability to adapt to desert environments. These new data will also be at the origin for genome-wide association studies to link economically relevant phenotypes to genotypes and to conserve the diverse genetic resources in Old World camelids. Keywords: *Camelus bactrianus*, *Camelus ferus*, *Camelus dromedarius*, Domestication, Genetic resource management, Genetic diversity.]

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 °2016 [pdf] *The Domestication of Camel in the Literary, Archaeological and Petroglyph Records*,  
 in: Journal of Arid Land Studies • sabaku kenkyū 沙漠研究 26-4:  
 205-211, 7 figs. <[http://dx.doi.org/10.14976/jals.26.4\\_205](http://dx.doi.org/10.14976/jals.26.4_205)>  
 <[https://www.jstage.jst.go.jp/article/jals/26/4/26\\_205/\\_pdf](https://www.jstage.jst.go.jp/article/jals/26/4/26_205/_pdf)>  
 (Special Reports, “Camel Husbandry in Central Asia” Annual  
 Symposium of the Japanese Association for Arid Land Studies)  
 [(camel domestication; visual representations)  
 Abstract: The domestication of camels happened at the start of the III millennium BC in their  
 natural habitats, for the dromedary in SE-Arabia, for the Bactrian camel in SW-Central Asia.  
 Three steps of camel domestication and use are distinguished: for harvesting its body products,  
 as transport animal (drafted, loaded, and ridden), as military animal. With the start of the I  
 millennium BC the introduction of new saddle types and of hybridization techniques promoted,  
 in all the arid expanses of Afro-Eurasia, the growing superiority of the loaded camel over  
 wheels and draft transports, and of camelry over cavalry. Key Words: Camel, domestication.]
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 °2017 [2 pdf] *Comparative Morphometry of Bactrian Camel and Dromedary*,  
 in: Journal of Mammalian Evolution (2017), [19p.] 10 figs.  
 Supplementary material: online resources 1-8; e.g. Figs. SO1-32, etc.  
 <<https://doi.org/10.1007/s10914-017-9386-9>>  
 [Abstract: There are two living species of Old World camelids (Camelidae, Artiodactyla): the  
 Bactrian camel (*Camelus bactrianus*) and the dromedary (*Camelus dromedarius*). Differences in  
 osteology between them are poorly known, and this lack of knowledge hinders archaeological  
 and paleontological research. Previous comparative studies have focused on subtle qualitative  
 differences, which are subject to great intraspecific variation and interspecific overlap. In this  
 study, we use simple morphometric methods and statistical analyses to compare the skeleton  
 of Old World camels. Over the entire skeleton we were able to find several consistent differences,  
 some univocal and highly diagnostic, others only slightly significant and noticeable only at a  
 population level. Some of the distinctive traits are suggestive of previously unknown biological  
 adaptations. In particular, the cranial anatomy of Bactrian camels shows characters correlated  
 with increased grazing, while its limb muscle attachments may indicate additional need  
 for lateral stability in a heavier animal. The presence and number of humps is reflected in the  
 vertebral column, with several differences that will be helpful in the reconstruction of fossil  
 species. Keywords: *Camelus*, Camelidae, Morphometry, Osteology.]
- (70) MOHANDESAN Elmira, SPELLER Camilla F., PETERS Joris, UERPMANN Hans-Peter,  
 UERPMANN Margarethe, DE CUPERE Bea, MICHAEL Hofreiter & BURGER Pamela A.  
 °2017 [pdf, docx] *Combined hybridization capture and shotgun sequencing for ancient DNA analysis  
 of extinct wild and domestic dromedary camel*,  
 in: Molecular Ecology Resources 17(2): 300-313, 3 figs., 1 table.  
 Supporting Information: Appendix S1; Figs. S1-S8; Tables S1-S7.  
 doi: 10.1111/1755-0998.12551 <<http://europemc.org/articles/PMC5324683>>  
 [Abstract: The performance of hybridization capture combined with next-generation sequencing  
 (NGS) has seen limited investigation with samples from hot and arid regions until now.  
 We applied hybridization capture and shotgun sequencing to recover DNA sequences from  
 bone specimens of ancient-domestic dromedary (*Camelus dromedarius*) and its extinct ancestor,  
 the wild dromedary from Jordan, Syria, Turkey and the Arabian Peninsula, respectively. Our  
 results show that hybridization capture increased the percentage of mitochondrial DNA  
 (mtDNA) recovery by an average 187-fold and in some cases yielded virtually complete mitochon-  
 drial (mt) genomes at multifold coverage in a single capture experiment. Furthermore, we  
 tested the effect of hybridization temperature and time by using a touchdown approach on a  
 limited number of samples. We observed no significant difference in the number of unique  
 dromedary mtDNA reads retrieved with the standard capture compared to the touchdown  
 method. In total, we obtained 14 partial mitochondrial genomes from ancient-domestic dromedaries  
 with 17-95% length coverage and 1.27-47.1-fold read depths for the covered regions.  
 Using whole-genome shotgun sequencing, we successfully recovered endogenous dromedary  
 nuclear DNA (nuDNA) from domestic and wild dromedary specimens with 1-1.06-fold read  
 depths for covered regions. Our results highlight that despite recent methodological advances,  
 obtaining ancient DNA (aDNA) from specimens recovered from hot, arid environments is still  
 problematic. Hybridization protocols require specific optimization, and samples at the limit of



DNA preservation need multiple replications of DNA extraction and hybridization capture as has been shown previously for Middle Pleistocene specimens.

Keywords: ancient DNA, *Camelus dromedarius*, capture enrichment, degraded DNA, mitochondrial genome (mtDNA), next-generation sequencing]

- (71) DÖVENER Franziska, OELSCHLÄGEL Carola, BOCHERENS Hervé  
°2018 [pdf] *Kamele im westlichen Treverergebiet – ein nahezu vollständig erhaltenes Dromedar aus dem vicus Mamer-Bartringen (Luxemburg)*,  
in: KOCH Michael (ed.) 2018: *Archäologie in der Großregion – Beiträge des internationalen Symposiums zur Archäologie in der Großregion in der Europäischen Akademie Otzenhausen vom 23.-26.03.2017*. (Archäologentage Otzenhausen. Band 4, 2017) Nonnweiler: Europäische Akademie Otzenhausen, pp. 187-204, 8 figs., 2 tables.  
<<https://www.academia.edu/36464012/>>  
[(Camelid remains in Europe, 1st-5/6th c. CE; dromedary skeleton from Mamer-Bertrange, Luxembourg)  
Abstract: *An almost complete dromedary found in the Roman vicus at Mamer-Bertrange (L)*  
During the archaeological excavations between 2009 and 2011 in the Roman settlement at Mamer-Bertrange (L), the almost complete skeleton of a dromedary was found. The 173 bones, weighing in total almost 48.50 lbs, were unearthed from the bottom layer of well that was 40.22 ft deep. The archaeozoological evaluation, conducted by Carola Oelschlägel from Halle (Germany), revealed the dromedary to have been a male, robust specimen of 6 to 7 years of age. The absence of any cut or chop marks on the bones indicate that the body was still in anatomical cohesion when it was thrown into the well which was thereafter used as a rubbish pit. The animal was probably already rather decayed then; otherwise, the body would probably could not have fit through the opening of the well, which was only 3.60 ft in diameter. From the well, the residues of 259 animals emerged out of its backfilling, among them slaughtering waste and scraps of food. Apart from the livestock customarily found in Roman settlements (cattle, pig, sheep/goat, poultry etc.), the bones of dogs, feral cats, a barn owl and corvids were identified, too. The backfilling of the well began in the middle of the 3rd c. AD, as indicated both by several Roman coins and timbers dated by dendrochronology. Isotopic analysis of tooth enamel and bone collagen samples from the dromedary as well as from a local reference group of animals, which were also found in the well, has been conducted by Hervé Bocherens from Tübingen University (Germany). The results suggest that the dromedary was probably born in Egypt and carried out a remarkable “mileage” during its relatively short life. The dromedary might have been the beast of burden of a merchant, but it seems more probable that it was been used in that way by the Roman military. The inscription on the altar of Fortuna, found in 2008 at Dalheim, proves that a military unit belonging to the *Legio VIII Augusta* had been in the area about 257 AD. These troops had often been on the eastern frontier of the Roman Empire. This suggests the most likely case history of the animal, but its presence and death here in Mamer cannot be conclusively explained. –  
Zusammenfassung: In der römischen Siedlung, die sich über die Grenze der Gemeinden Mamer und Bartringen (Luxemburg) erstreckt, wurde bei Ausgrabungen in den Jahren 2009-2011 das nahezu vollständige Skelett eines Dromedars entdeckt. Die 173 Knochen, die zusammen ein Gewicht von fast 20 kg besitzen, kamen in der feucht-lehmigen Verfüllung eines 12,26 m tiefen Brunnens zutage. Die archäozoologischen Untersuchungen, die Carola Oelschlägel aus Halle (Deutschland) 2014 durchführte, ergaben, dass es sich um ein männliches, robustes 6-7 Jahre altes Tier gehandelt hatte. Das Fehlen von Schnitt- oder Hackspuren an den Knochen legt nahe, dass sich das Dromedar noch im anatomischen Verband befand, als es in den Brunnen gelangte, der zu diesem Zeitpunkt bereits als Abfallgrube genutzt wurde. Vermutlich war das Tier bereits stark verwest gewesen, so dass sein geschrumpfter Körper durch die mit einem Durchmesser von nur 1,10 Meter recht enge Brunnenöffnung passte. In dem Brunnen wurden die Überreste von 259 Individuen gefunden, darunter auch Schlacht- und Speiseabfälle. Außer den für römische Siedlungen typischen Nutztieren (Rind, Schwein, Schaf/Ziege, Hühnervogel usw.) fanden sich auch Knochen von Hunden, Wildkatzen, einer Schleiereule und Rabenvögeln. Durch römischen Münzen sowie dendrochronologisch datierte Hölzer, die aus dem Brunnen geborgen wurden, lässt sich der Beginn der Verfüllung des Brunnens in die zweite Hälfte des 3. Jahrhunderts n. Chr. datieren. Sowohl vom Dromedar als auch von einer lokalen Vergleichsgruppe (Nutztiere aus demselben Kontext) wurden Proben entnommen, anhand derer Hervé Bocherens an der Universität Tübingen (Deutschland) Isotopenanalysen des Zahnschmelzes und des Knochenkollagens durchführte. Die Resultate lassen vermuten, dass das Dromedar wahrscheinlich in Ägypten zur Welt kam und in seinem vergleichsweise kurzen Leben eine enorme “Laufleistung” erbracht hat. Das Dromedar könnte beispielsweise von einem Händler als Lasttier verwendet worden sein, wahrscheinlicher ist jedoch, dass es vom Militär in dieser Weise genutzt wurde. Wie die Inschrift des 2008 in Dalheim gefundenen Fortuna-Altars belegt, befand sich um 257 n. Chr. in der Region ein Trup-

pentheil der *Legio VIII Augusta*, die mehrfach an den Ostgrenzen des Reichs im Einsatz gewesen war. Die Gründe für die Anwesenheit und den Tod des Dromedars in Mamer sind damit allerdings noch nicht geklärt. –

191: Tabelle 1. Mamer – “Bierg By Pass”, Brunnen 2. Materialübersicht. Prozentualer Anteil der einzelnen Arten an den bestimmmbaren Knochen (n. Knochenzahl) in Klammern (Tabelle: C. Oelschlägel, D).

195-198: Tabelle 2. Auflistung der Fundorte von Kamelknochen in Europa von Westen nach Osten (68 sites]



Abb. 7. Verbreitungskarte von Kamelknochen-Funden (1.-5./6. Jahrhundert n. Chr.) in Europa (Auflistung der Fundorte s. Tabelle 2) (Grafik: C. Klopp, CNRA, L). Für die Fundkontexte von 63-66 ist die Datierung unklar (hellenistisch/römisch).



Abb. 6. Darstellung eines Kamels mit Führer (Relief, Kapitolinische Museen, Inventarnummer 225) (Foto: V. Krier-Stoll, Moutfort, L).

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[Pl. XVI: *The Points of the Camel*. Pl. XVII: *Riding Camels*. Pl. XVIII: *Hamla Camels*. Pl. XIX: *Saddles*. Pl. XIX: *Makhluḥa*; *Kur el Deleigab*, Pl. XX: *Kur el Hadendowa*; *Bedid*; Pl. XXI: *Hawia* (baggage saddle); Pl. XXII: *Khurg* (saddle bags); *Jurab* (saddle bag); Pl. XXIII: *Qirfa* (grain bag); *Saga* (water skin).  
136-141: (8) *Veterinary notes*. Sores and bruises; lameness; fly “trypanosomiasis”; mange; contagious necrosis of the skin (*Na'eih*); constipation; diarrhoea; colic; *Habbub*; *Khilfa*; *Ramad*; wry neck; rutting; loss of condition; firing (therapy).  
142-149: Glossary: general terms; ages; attributes; defects and diseases (u.a. “A disease? *ghudda*”); no English equivalent; paces; saddlery; watering terms; travelling; colours; parts of the body (see Pl. XVI).]
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- (80) FINBERT E.-J.  
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[(visual representations of camelids) (51) POTTS 2004: 151 “But a shaft-hole axe excavated by Sir Aurel Stein in a grave at Khurab, in Iranian Baluchistan, is widely thought to show a Bactrian camel in repose (...).”]
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[(visual representations of camelids; rock art)  
• Hunting of wild dromedary. Sha’ib Musamma, Saudi Arabia. 3000 BC.  
(57) VON DEN DRIESCH *et al.* 2008: 495, Fig. 7; (106) SPASSOV & STOYTCHEV 2004: 152, Fig. 1;  
(61) CURCI *et al.* 2014: 219, Fig. 10; (68) SALA 2016: 206, Fig. 1.]



Fig. 7—Rock art demonstrating a hunting scene on a wild dromedary (according to Anati 1968).

- (85) \*1997 *L’Art rupestre dans le monde. L’Imaginaire de la préhistoire*.  
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[(visual representations of camelids; rock art)  
• Hunting of wild dromedary. Sha’ib Musamma, Saudi Arabia. 3000 BC.  
99: fig. 69. Area code: B-IV.  
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(61) CURCI *et al.* 2014: 219, Fig. 10; (68) SALA 2016: 206, Fig. 1.]
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[(visual representations of camelids)]

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pp. 161-173, 3 maps, 1 diagram, 1 table.  
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53<sup>rd</sup> Annual Meeting of EAAP, Cairo, 2002, Session H5.2.  
[Presentation: 24p., pdf; paper, 9p. doc.]  
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[Abstract: The dromedary is a very versatile work animal within dryland farming systems. It  
can be used for all types of work which are usually allocated to oxen and equines. This inclu-



des wheeled transport, soil cultivation and seedbed preparation, drawing water for irrigation purposes, driving oil mills and other processing devices, as well as serving as a pack animal for agricultural transport wherever wheels are not a technical option. / In dry environments the dromedary has distinct biological advantages over bovines and equines in terms of nutrition and water economy. It also compares favourably to both species groups in terms of work performance. The major constraints to more widely spread usage of this animal are the low recruitment rates in dromedary herds and hence the higher market prices, the competitiveness of other markets, especially the Arabian meat market, as outlets for dromedaries and the fact that although animal draught technology is well introduced for bovines and equines there are few implements readily available which have been optimised for the use with dromedaries. Research and development activities should take a two-pronged approach: first to increase recruitment rates and secondly to adapt available animal draught technology to the unique anatomy of the dromedary. It is most likely that the latter one will be more immediately promising than the first.]

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 THE CAMEL CONFERENCE @ SOAS School of Oriental and African Studies [SOAS] University of London Saturday 9 - Sunday 10 May 2015. [Presentation: 47p.; paper 3p.]  
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 Abstract: The iconic image of the camel as the “ship of the desert” is still firmly embedded in European understanding, although the camel today is largely a dairy animal and meat producer. One reason for this certainly is that the camel has been depicted in occidental art since 2000 years as pack or riding animal. / The first few representations of camels appeared in Europe during the early Roman Imperial and Byzantine periods. Between the 6th and the 11th century images of camels were rare in Europe. They reappeared in the 12th century as mosaics in Sicily and wall paintings in Spain, and later in the Gothic period also in book illustrations, i.e. in medieval bestiaries. Images were obviously based on second hand descriptions rather personal acquaintance with the animals. This changed in the more learned Natural Histories of the 16th to 18th centuries. As scientists and artists started to travel themselves from the late 18th century there was a proliferation of etchings, drawings and paintings to almost photo-realistic precision. During the first three decades of the 20th century camels were a favoured subject of heroic war scenes, whereas the interest in the general art scene was flagging. Today they serve mostly as objects for advertising campaigns. Key words: Camels, Europe, visual arts.]
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 Contents: Acknowledgements / Preface  
*Introduction: The camel (C.dromedarius) in Eastern Africa* (H.J. Schwartz)  
 Distribution and economic potential  
 Camel production in Bastern Africa: A status report  
 I. *The biology of the camel* (H.J. Schwartz)  
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 II. *The productive potential of the camel* (H.J. Schwartz and M.G.H. Walsh)  
 Products and performances  
 Productivity  
 Productive potential  
 III. *Management and handling of the camel* (M. Dioli, H.J. Schwartz and R. Stimmelmayr)  
 Reproduction  
 Conformation  
 Age determination  
 Weight determination  
 Traditional management practices  
 Modern management practices  
 IV. *Important camel diseases* (M. Dioli and R. Stimmelmayr)  
 Generalized conditions  
   Pox  
   Contagious ecthyma  
   Papillomatosis  
   Trypanosomiasis  
   Haemorrhagic septicemia  
 Diseases of the gastro-intestinal system  
 The respiratory diseases complex  
 Ectoparasites  
   Sarcoptic mange  
   Dermatomycosis  
   Skin necrosis  
   Ticks infestation  
   Fly infestation  
 Abscesses, wounds and lesions  
 Diseases and disorders of the nervous system  
   Rabies  
   Stiff neck (Tetanus)  
   Wry neck syndrome  
   Facial paralysis  
   Plant poisoning  
 Ocular diseases  
 V. *Field guide to post-mortem examination* (R. Stimmelmayr, M. Dioli and H.J. Schwartz)  
 Brief introduction to the anatomy of the camel  
 Necropsy performance  
 Necropsy examination sheet  
 Common necropsy findings  
 VI. *Annexes*  
 1. *A study of tick infestation in four nomadic camel herds in Northern Kenya* (M. Dioli)  
 2. *Common range forage species preferred by camels and their nutritional value* (H.J. Schwartz)  
 VII. Glossary of terms / Subject index of references / Picture credits. –  
 (no plague mentioned)]

(102) VOGT B.  
 1994

*Death, resurrection and the camel,*  
 in: NEBES N. (ed.) 1994: *Arabia Felix, Beiträge zur Sprache und Kultur des vorislamischen Arabien. Festschrift Walter W. Müller zum 60. Geburtstag.*  
 Wiesbaden: Harrassowitz Verlag, pp. 279-290.

(103) KÖHLER-ROLLEFSON Ilse Ulrike, HARRIS D.  
 1996

*The One-Humped Camel in Asia: Origin, Utilization and Methods of Dispersal. The Origins and Spread of Agriculture and Pastoralism in Eurasia.*  
 London: UCL Press.

- (104) HARE John  
1998 *The lost camels of Tartary.*  
London: Little, Brown.
- (105) MANEFIELD G.W. & TINSON A.H.  
2000 *Camels: A compendium.*  
(Vade Mecum Series for Domestic Animals Series C 22)  
Sydney: T.G. Hungerford.
- (106) SPASSOV Nikolay & STOYTICHEV Todor  
°2004 [pdf] *The Dromedary Domestication Problem: 3000 BC Rock Art Evidence for the Existence of Wild One-humped Camel in Central Arabia,*  
in: *Historia naturalis bulgarica* 16: 151-158, 3 figs.  
<[https://www.researchgate.net/profile/Spassov\\_Nikolay/publication/255637433](https://www.researchgate.net/profile/Spassov_Nikolay/publication/255637433)>  
[(visual representations of camelids; rock art)  
• Hunting of wild dromedary. Sha'ib Musamma, Saudi Arabia. 3000 BC.  
Abstract. The paper discusses a rock depiction—probably the earliest—of a one-humped camel (Sha'ib Musamma open-air site, Saudi Arabia, ca. 3000 BC) in the context of the still unclear problem of dromedary's domestication, and the time and place of this. The enigmatic wild ancestor is discussed too. According to our analysis, the depiction shows a scene of hunting a wild one-humped camel - the latest known evidence for the existence of the wild form.]
- (107) LOKHIT PASHU-PALAK SANSTHAN [LPPS, i.e. “Pastoralist Welfare Institute”]  
°2005 [doc] *Saving the Camel and Peoples' Livelihoods: Building a Multi-Stakeholder Platform for the Conservation of the Camel in Rajasthan.*  
Proceedings of an International Conference held on 23-25 November 2004 in Sadri. Lokhit Pashu-Palak Sansthan, Sadri, Rajasthan, India.  
[doc, 93p.; Note: The [thirteen] papers in this volume have not been edited.]  
<[http://www.lpps.org/wp-content/uploads/2013/07/camel\\_conf\\_proc.doc](http://www.lpps.org/wp-content/uploads/2013/07/camel_conf_proc.doc)>
- (108) ZEDER Melinda A.  
°2006 [pdf] *Archaeozoology in Southwest Asia: A Status Report Based on the 8th Meeting of the ASWA Working Group 2006 (Lyon, June 28th – July 1st 2006),*  
in: *Paléorient* 32(1): 137-147. doi: 10.3406/paleo.2006.5177.  
<[http://www.persee.fr/doc/paleo\\_0153-9345\\_2006\\_num\\_32\\_1\\_5177](http://www.persee.fr/doc/paleo_0153-9345_2006_num_32_1_5177)>  
[(review article)  
Abstract: The biennial meeting of the Archaeozoologists of Southwest Asia (ASWA) Working Group is an excellent barometer of the health and status of archazoological research in this pivotal world area. The geographic focus of this group encompasses the territory from the Southern Sinai to northwestern Anatolia, from the Eastern Mediterranean to the Iranian Plateau. It also includes adjacent areas that border this vast area to the west, north, south, and east. The temporal reach of this working group encompasses all of human history in this region, from the Lower Paleolithic to the present day. The range of problems that occupy researchers who attend this meeting are among the most enduring in human history and include the earliest dispersal of hominines into and across this region, the origins or agriculture, and the rise and fall of cities. As such, the papers presented at ASWA meetings provide a comprehensive overview of what researchers working on these problems are thinking and accomplishing. The most recent ASWA meeting in Lyon (June 28th-July 1st 2006) provided an especially informative status report on archaeozoological research in this area, its successes, its challenges, and its future directions.  
142-144: on camels.]
- (109) LARSSON Göran  
°2008 [pdf] *Mangy camels, noble stallions and the disreputable tail fat of lizards. Animals in Ibn Garcías's epistle on the “Shu'ūbiyya”,*  
in: *Al-Qanṭara* XXIX(2): 495-503, 2 tables.



<http://al-qantara.revistas.csic.es/index.php/al-qantara/article/download/67/61>

[(camels stand for Arabs; horses for non-Arabs)]

495: "Part I / [...] for there was no better way of describing human qualities in a vivid manner than to compare them with those of the animals, with whose behaviour and properties the inhabitants of the desert were bound to be very familiar, as on that knowledge in many respects their very existence depended.<sup>1</sup> /

The above quotation is taken from Lothar Kopf's introduction to his translation of Ibn Qutayba's *Uyūn al-Akhhbār* ("Book of useful knowledge") and illustrates clearly that animals are often used as vessels of communication in Arabic literature, conveying a deep symbolic and metaphorical meaning that goes far beyond zoology. Irrespective of their importance in Arabic and Islamic traditions, to the best of my knowledge animals have rarely been analysed or viewed as symbolic and literary epitomes."]

- (110) MAYEUR-JAOUEN Catherine, FAROQHI Suraiya  
2010 *Badawi and his Camel: an Animal as the Attribute of a Muslim Saint in Mamluk and Ottoman Egypt*. Translated by Suraiya FAROQHI,  
in: FAROQHI Suraiya (ed.) 2010: *Animals and People in the Ottoman Empire*.  
Istanbul: Eren, pp.113-128.  
[camel as attribute of a Muslim saint: Al-Sayyid AL-BADAWĪ (596-674/1200-1276).]
- (111) MARGÓCSY Dániel  
°2011 [pdf] *The camel's head: Representing unseen animals in sixteenth-century Europe*,  
in: Nederlands Kunsthistorisch Jaarboek (NKJ) • Netherlands  
Yearbook for History of Art, Vol. 61, Art and Science in the Early  
Modern Netherlands • Kunst Enwetenschap in de Vroegmoderne  
Nederlanden (2011): 61-85.  
<http://www.jstor.org/stable/43884968>  
[(visual representation of camelids, and of unseen animals in 16th c. Europe)]
- (112) CHULUUNBAATAR Otgonbayar  
°2012 [pdf] *The Camel and its Symbolism in the Daily Life of the Mongols with Particular  
Reference to their Folk Songs*,  
in: KNOLL Eva-Maria & BURGER Pamela (eds.) 2012: *Camels in Asia  
and North Africa. Interdisciplinary Perspectives on their Past and Present  
Significance*. (Österreichische Akademie der Wissenschaften,  
Philosophisch-Historische Klasse, Denkschriften, 451. Band)  
Wien: Verlag der Österreichischen Akademie der Wissenschaften,  
pp. 95-105, 256-259 (pictures 23-28).  
<https://www.academia.edu/5588463/>  
[Abstract: Animals are an essential aspect for the survival of a society characterized by nomadic traditions. It is little known that for Mongolians the performance of music, and especially chanting, has been an indispensable factor in livestock-breeding itself. This article shows how the camel has its established place in legends, parables, metaphors, ritual songs and everyday folk songs, as well as in modern literature. All these art forms often also impart knowledge pertaining to the camel or its significance for Mongolians.]
- (113) HEISS J.  
2012 *Caravans from South Arabia: roads and organization*.  
in: KNOLL Eva-Maria & BURGER Pamela (eds.) 2012: *Camels in Asia  
and North Africa. Interdisciplinary Perspectives on their Past and Present  
Significance*. (Österreichische Akademie der Wissenschaften,  
Philosophisch-Historische Klasse, Denkschriften, 451. Band)  
Wien: Verlag der Österreichischen Akademie der Wissenschaften,  
pp. 131-139.

- (114) KNOLL Eva-Maria & BURGER Pamela (eds.)  
 2012 *Camels in Asia and North Africa. Interdisciplinary perspectives on their past and present significance.*  
 (Österreichische Akademie der Wissenschaften, Philosophisch-Historische Klasse, Denkschriften, 451. Band)  
 Wien: Verlag der Österreichischen Akademie der Wissenschaften.  
 [ISBN 978-3-7001-7244-4.]

- (115) CROWLEY Sarah L.  
 2014 *Camels Out of Place and Time: The Dromedary (Camelus dromedarius) in Australia,*  
 in: *Anthrozoos* 27(2): 191-203.

- (116) MORRISON Alexander  
 °2014 [pdf] *Camels and Colonial Armies: The Logistics of Warfare in Central Asia in the Early 19th Century,*  
 in: *Journal of the Economic and Social History of the Orient* 57(4): 443-485, 3 figs., 2 maps. <<https://doi.org/10.1163/15685209-12341355>>

[(camel transport, 19th c.) Abstract: This article explores the use of camels for baggage transport by European colonial armies in the nineteenth century. It focuses in particular on two episodes: the Russian winter expedition to Khiva, and the march of the Army of the Indus into Afghanistan, both of which took place in 1839. However sophisticated their weapons and other technology, until at least the 1880s European colonial armies were forced to rely exclusively on baggage animals if they wanted to move around: railways arrived very late in the history of European expansion. In Central Asia this meant rounding up, loading, managing and feeding tens of thousands of camels, which could only be furnished by the pastoral groups who inhabited the region, who in some cases were also the objects of conquest. Camel transport placed certain structural constraints on European conquest in Central Asia: firstly it meant that the forces involved were almost always very small; secondly it prevented the launching of spontaneous or unauthorised campaigns by “men on the spot,” as every advance had to be preceded by the rounding up of the necessary baggage animals, and the creation of a budget to pay for them. Finally, the constraints imposed by camel transport ensured that British and Russian armies would never meet in Central Asia, and that a Russian invasion of India was a chimera. Keywords: Colonialism; Khiva; Afghanistan; Commissariat; Warfare; Camels.]



454: Fig. 1: “‘Packs with Sukhari and oats’ showing a Qazaq Vozhak (driver) with baggage camels. From M. I. Ivanin *Opisanie zimnego pokhoda v Khivu v 1839-40g* (1874).”

456: Fig. 2: “‘Infantry of the Orenburg line battalions in winter expeditionary clothing’, showing both Camels and soldiers from the Khiva expedition in winter garb. From M. I. Ivanin *Opisanie zimnego pokhoda v Khivu v 1839-40g* (1874).”

- (117) BAUM Doug  
 °2015 [pdf] *The camel saddle: a study.*  
 The Camel Conference @ SOAS 2013. [pdf, 7p., 2 figs.]  
 <<https://www.soas.ac.uk/camelconference2013/file88887.pdf>>

(118) ERDENE BOLD Lhagvasuren

°2017 [pdf]

*Preliminary Excavation Findings from Shoroon Bumbagar, Ulaan Kherem, Mongolia,*

in: ALLINGER Eva, GRENET Frantz *et al.* (eds.) 2017: *Interaction in the Himalayas and Central Asia. Processes of Transfer, Translation and Transformation in Art, Archaeology, Religion and Polity. Proceedings of the Third International SEECHAC Colloquium, 25-27 Nov. 2013, Austrian Academy of Sciences, Vienna.* Vienna: Austrian Academy of Sciences Press, pp. 29-54, 30 col. figs.

<http://www.austriaca.at/0xc1aa5576%20x00358436.pdf>

[(Turkic tomby in Shoroon Bumbagar, Ulaan Kherem, Mongolia; dated to 670±70 or 680±100CE; wall paintings; figures of humans and animals; figural representation of camel in clay)

Includes high-res photographs by ERDENE BOLD from 2011. –

WAUGH: There is a book note with listing of the full table of contents of this impressive volume in *The Silk Road*, Vol. 15 (2017): 177.]



Fig. 10: Clay figurine of a camel (photo: L. Erdenebold, 2011).

## Medieval Dunhuang Manuscripts

### (119) Pelliot chinois 4717.

1 f. mutilée au bord droit. Pap. irrégulier, chamois clair grisé (10 YR 8/2 et 8/3). Verg. 4 par cm env. Rangée de petits trous sur les bords sup. (à gauche) et inf. Trous et échancrures. Montage sur f. de restauration. 30,5 × 32,5 cm

Xe siècle

Section: Recto *Chameau*.

Dessin à gros traits. Encre pâle. Œuvre de médiocre qualité. L'animal est équipé d'un filet sur les deux bosses pour porter les charges. Un licol est passé dans ses naseaux.

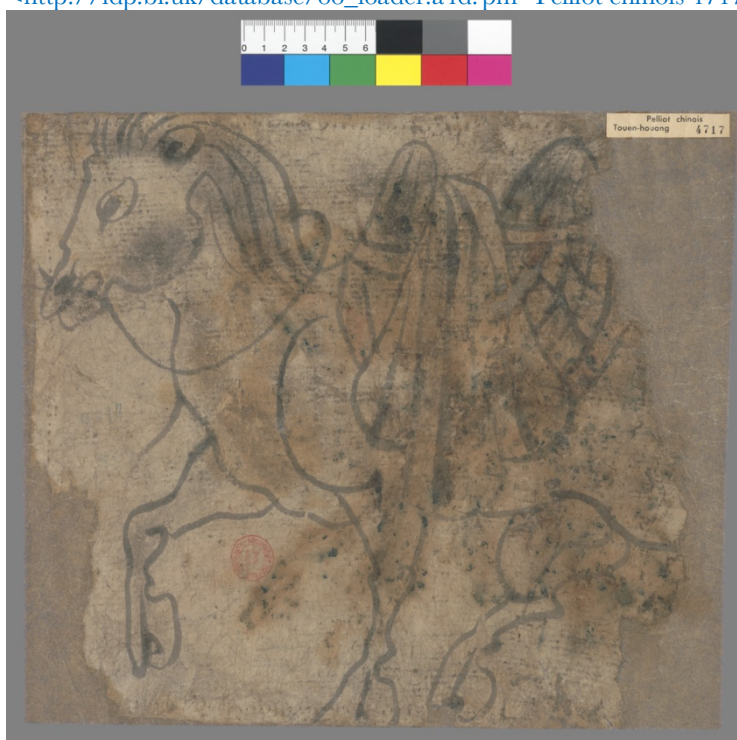
Cf. S. painting 77, repr. in: BM, 2, pl. 56, représentant un cheval et un chameau. Le chargement du chameau ressemble beaucoup à celui de notre dessin. Sont comparables aussi son nez et sa crinière. Cf. également le chameau du Pelliot chinois 4513.

Repr. et étudié in: PM, pl. LIII et 1, p. 26 a.

[BM: WHITFIELD Roderick 1982-1985 *The Art of Central Asia: The Stein Collection in the British Museum*. Tokyo: Kodansha International Ltd.

PM: JAO Tsong-yi 1978 *Peintures monochromes de Dunhuang*. Paris: École Française d'Extrême-Orient.]

<[http://idp.bl.uk/database/oo\\_loader.a4d?pm=Pelliot chinois 4717](http://idp.bl.uk/database/oo_loader.a4d?pm=Pelliot chinois 4717)>



<[http://idp.bl.uk/image\\_IDP.a4d?type=loadRotatedMainImage;recnum=171236;rotate=0;imageType=\\_M](http://idp.bl.uk/image_IDP.a4d?type=loadRotatedMainImage;recnum=171236;rotate=0;imageType=_M)>



(120) Pelliot chinois 2010+4513.

*Miao fa lian* [hua jing] 妙法蓮[華經], traduction de Kumārajīva 羅什.

Rouleau de 17 feuilles. Feuille 1 mutilée: 41,5 cm; feuille 2 mutilée: 27 cm; feuilles 3-16: 39,7-42,6 cm; feuille de roulage [feuille 17]: 20,3 cm. Papier assez irrégulier, peu épais, beige clair (entre 10 YR 7/3 et 10 YR 8/3). Vergeures 5 par cm. Nombreuses taches, trous, fentes et échancrures. Montage sur feuille de restauration.

27 à 28 x 674,8 cm. Document en chinois.

Bibliographie: DRÈGE Jean-Pierre, MORETTI Constantino 2014 *La fabrique du lisible. La mise en texte des manuscrits de la Chine ancienne et médiévale*, Collège de France, Institut des Hautes Etudes chinoises.

Présentation du contenu

[juan 7, pin 25]. T. 262, vol. 9, pp. 56 c 2.1-58 b 7.

Une lacune par mutilation, entre les colonnes 14 et 15. A la partie supérieure, un bandeau illustré tracé à l'encre rehaussé de couleurs : bleu gris, rose violet, rouge sombre, orangé, rose orangé, jaune pâle, vert olive, vert foncé, brun. Le dessin est d'exécution maladroite mais les scènes sont néanmoins vivantes, bien enlevées. Elles sont intéressantes notamment par les costumes des personnages laïcs et militaires.

Titre final : *Guan yin jing yi juan* 觀音經一卷.

Pour d'autres copies du même texte, illustrées selon le même procédé, cf. S 5642 et 6983.

Ecriture *k'ai*. Quelques caractères grattés et récrits. 1 caractère ajouté (col. 35). 1 signe d'inversion. 198 colonnes en tout dont 18 mutilées, 9 à 12 caractères par colonne. Marges tracées, supérieures de 1,6 à 2, 2 cm, inférieures de 1,5 à 2 cm. Des colonnes sont laissées vides afin que le texte soit bien situé sous les illustrations qui lui correspondent. Le texte et les illustrations sont séparés par un trait. Illustrations séparées entre elles par un double filet. Hauteur des illustrations: 8,9 à 11,4 cm. Quelques légers débordements dans les marges. Hauteur du texte: 14 à 14,7 cm. Réglure. 1,7 cm.

Documents de substitution

Manuscrit numérisé d'après l'original (Pelliot chinois 4513).

*Fa hua xuan zan* 法華玄贊, cf. *Miao fa lian hua jing xuan zan*. • *Guan yin jing* 觀音經, cf. *Miao fa lian hua jing*. • Kumārajīva 羅什 • Luo shi 羅什, cf. Kumārajīva, • *Miao fa lian hua jing* 妙法蓮華經 • Saddharmapuṇḍarīka-sūtra, traduction de Kumārajīva, cf. *Miao fa lian hua jing*. • Saddharma-puṇḍarīka-sūtra

<<http://gallica.bnf.fr/ark:/12148/btv1b8303116z>>

<<http://gallica.bnf.fr/ark:/12148/btv1b52508641g/>>

[a saddled camel and several horses.]



<[http://idp.bl.uk/image\\_IDP.a4d?type=loadRotatedMainImage;recnum=188558;rotate=0;imageType=\\_M](http://idp.bl.uk/image_IDP.a4d?type=loadRotatedMainImage;recnum=188558;rotate=0;imageType=_M)>

(121) Pelliot chinois 3448.

Rouleau de 2 ff. F. 1 [f. de couverture], déchirée sur le bord droit : 20,4 cm ; f. 2 : 42,2 cm. Pap. assez épais, à verg., ocre foncé pour la f. 1, beige pour la f. 2. Plusieurs taches. Nombreux trous, fentes et échancrures. Une trace de pliure longitudinale au milieu. 28,3 × 62,6 cm

Verso: Contrat de location d'un chameau.

Présentation du contenu

Document par lequel les particuliers Dong Shan tong 董善通 et Zhang Shan bao 張善保 louent à Liu Da zi 劉達子, un chameau jaune de 10 ans pour se rendre à la capitale. Daté du 20e jour du 9e mois de l'an xin mao.

A la suite, sur la partie inf. de la f., figurent les signatures du propriétaire, des locataires, du témoin Shi Xing zi 史興子 et du garant, le ya ya Zhang Qing shun 張慶順.

Le texte est précédé des 2 car. *xin mao*.

• Repr., éd. et trad. par J. Gernet in MSPD, 1, pl. 1 et pp. 45-46.

[MSPD: *Mélanges de sinologie offerts à Paul Demiéville*. Bibliothèque de l'Institut des Hautes Études Chinoises, vol. XX, 1 et 2. Paris, 1966 et 1974.]

• Éd. par Niida Noboru in Tōhō gakuō 東方學報 (Tōkyō), 9 (1939), pp. 101-102.

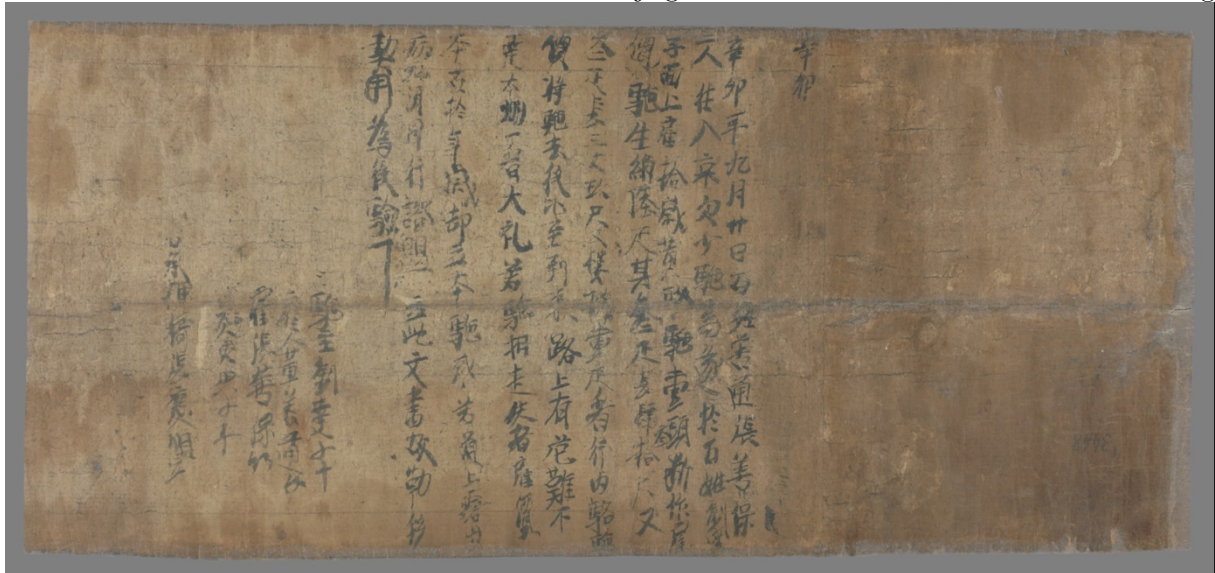
Au rev. de la f. 2, 15 col. en sens inverse du recto.

Écr. xing. Encre noire. 14 car. par col. Marges sup. et inf. 0,1 cm.

Shi Xing zi 史興子 • Liu Da zi 劉達子 • Zhang Shan bao 張善保 • Zhang Qing shun 張慶順

• Dong Shan tong 董善通

Recto: *Bo re bo luo mi duo xin jing* 般若波羅蜜多心經, trad. de Xuan zang.



<[http://idp.bl.uk/image\\_IDP.a4d?type=loadRotatedMainImage;recnum=189569;rotate=0;imageType=\\_M](http://idp.bl.uk/image_IDP.a4d?type=loadRotatedMainImage;recnum=189569;rotate=0;imageType=_M)>

(122) Pelliot chinois 2652.

Rouleau de 4 ff. dont 3 de 42,3 à 43,9 cm (f. 4 mutilée : 32,9 cm, bord gauche déchiré en biais). Pap. ordinaire, peu épais, à grosses verg., beige clair. Taches de gras et d'humidité ; taches de colle au raccord des ff. 1-2 (verso). Le texte du recto transparait au verso et inversement. Échancrures et trous dus à des brûlures, allant s'agrandissant le long du bord inf. Éraflure (f. 3 recto.). 29,4 à 30,5 × 161,7 cm

Section: Recto *Tian di kai pi yi lai di wang ji* 天地開闢已來帝王記.

En 1 j., fin manque.

Titre initial : *Tian di kai pi yi lai di wang ji yi juan* 一卷. Col. 2 à 12: préambule; à partir de la col. 13, texte sous forme de questions et réponses.

Les col. 8 à 95 correspondent, avec quelques variantes, au : Pelliot chinois 4016, col. 1 à 62 et 73 à 141.

A droite du texte, inscrit dans la 1re col. : exercice d'écriture sur les 2 premiers car. du titre.

Écr. médiocre, assez rapide, car. en hauteur, traits parfois empâtés. Rares additions et corrections, 1 rature. 95 col. dont 50 mutilées. 25 ou 26 col. par f., 19 à 25 car. par col. après le préambule, réponses inscrites en car. plus petits sur col. dédoublées. Marges sup. 0,5 à 1,5 cm, inf. 0,7 à 1,5 cm. Réglure.

Section: Verso: Emprunt d'un chameau (contrat).

1. Contrat.

Brouillon inachevé. Emprunt d'un chameau par Song Chong [-] 宋虫 [-] du canton de Hong run 洪潤鄉 ; daté du 22e jour du 1er mois d'une année bing wu.

Éd. THTS , n° 53, fasc. 3, p. 225 ; TSHB , p. 418 ; THTS , I, p. 345.

Cf. GERNET J. 1957 *La vente en Chine d'après les contrats de Touen-houang (IX-Xe siècles)*, in: T'oung Pao XLV(4/5): 295-391, p. 329 n. <<http://www.jstor.org/stable/4527462>> [pdf]

Au rev. de la f. 3, col. 1 à 7.

Même main qu'au recto.

Écr. grossière, assez grands car., traits épais. 1 addition partiellement mutilée. 7 col. en tout dont 3 mutilées, 16 ou 17 car. par col. Marges non tracées, sup. 0,3 à 0,9 cm, inf. 0,1 à 0,9 cm.

2. Zhu za xie he 諸雜謝賀.

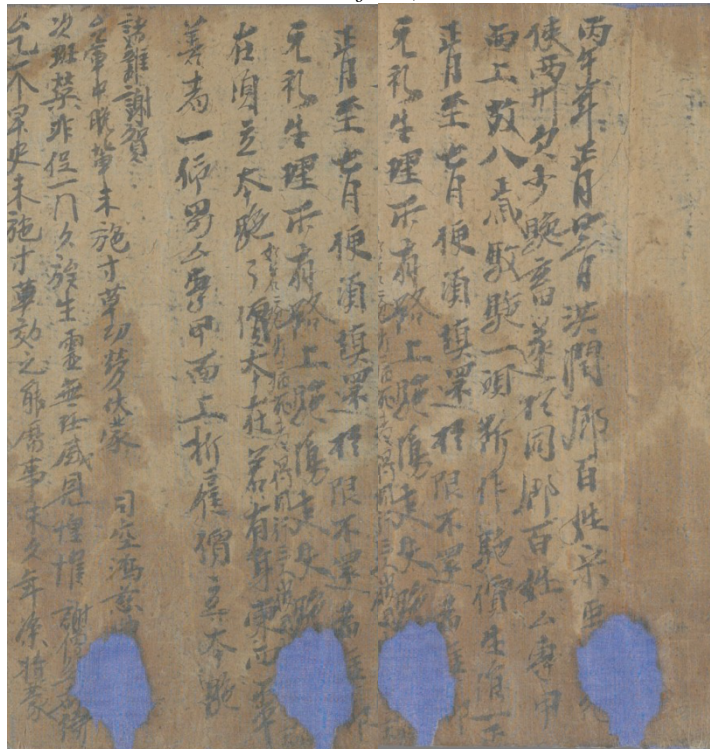
Formules de remerciements ou de félicitations.

Au rev. des ff. 3 à 1, col. 8 à 62.

Même main que recto et verso 1.

Écr. inélégante, rapide, traits parfois empâtés. Encre pâle par endroits. Rares additions et fautes ; quelques corrections. 55 col. dont 30 mutilées. 25 col. par f. entièrement inscrite, 20 à 24 car. par col. Marges non tracées, sup. 0,2 à 0,6 cm, inf. 0,1 à 2,9 cm.

3. Car. tian 天 inscrit à l'encre jaune, au rev. de la f. 1.



<[http://idp.bl.uk/image\\_IDP.a4d?type=loadRotatedMainImage;recnum=178284;rotate=0;imageType=\\_M](http://idp.bl.uk/image_IDP.a4d?type=loadRotatedMainImage;recnum=178284;rotate=0;imageType=_M)>  
<[http://idp.bl.uk/image\\_IDP.a4d?type=loadRotatedMainImage;recnum=178285;rotate=0;imageType=\\_M](http://idp.bl.uk/image_IDP.a4d?type=loadRotatedMainImage;recnum=178285;rotate=0;imageType=_M)>



(123) Pelliot chinois 3625.

Modèles de lettres de politesse.

Livret de 8 feuillets composé de 4 bifeuillets pliés en deux et collés. Pap. homogène, beige clair. Verg. 4 à 5 par cm. Feuille 1 mutilé. Coins biseautés. Taches d'humidité et de gras. Montage sur f. de restauration. 14,5 × 15 cm

Xe siècle

Document en chinois.

Présentation du contenu (recto)

a. Deux lettres de félicitation adressées à un *tai bao* 太保, à l'occasion d'une chute de neige et d'une pluie après une sécheresse.

Sur les feuillets 2 a-3 a, 14 col.

b. Quatre lettres de remerciements pour l'octroi d'un poste, le don d'un cheval, d'un chameau, d'une résidence, présentées à un *tai bao*.

Sur les feuillets 3 a-6 b, 35 col.

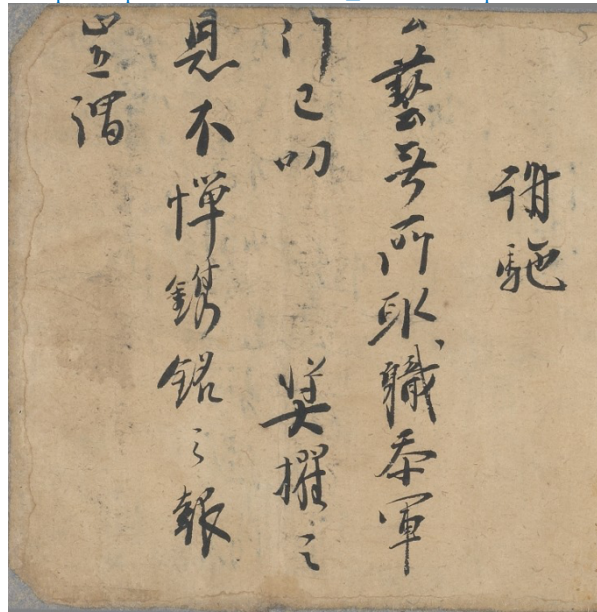
c. Cinq lettres de politesse et de remerciements adressées à un « émissaire impérial » *tian shi* 天使. Mention d'un *shang shu* 尚書.

Sur les feuillets 6 b-8 b, 27 col.

Écr. xing à cursive, habile. Encre foncée. 1 car. *min* 民, col. 11. Présentation habituelle des lettres, avec alinéas et espacements. Signes d'inversion. 76 col. en tout, 6 col. par feuillet, 9 à 10 car. par col. Feuille 1 non inscrit.

[shang shu 尚書 • tai bao 太保 • tian shi 天使.

<[http://idp.bl.uk/database/oo\\_loader.a4d?pm=Pelliot%20chinois%203625](http://idp.bl.uk/database/oo_loader.a4d?pm=Pelliot%20chinois%203625)>



<[http://idp.bl.uk/image\\_IDP.a4d?type=loadRotatedMainImage;recnum=177479;rotate=0;imageType=\\_M](http://idp.bl.uk/image_IDP.a4d?type=loadRotatedMainImage;recnum=177479;rotate=0;imageType=_M)>



## Camel Plague • *Pestis camelorum* • *chuma verblyudov*

Terminology:

- Arab. *gudda*, camel bubo
- *loleisis*, camel plague, also for human plague (Western Sahara, Mauretania)

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### 1870

- (124) KUZ'MINSKIY N. КУЗЬМИНСКИЙ Н. [KUZMINSKY]  
1876 *Chuma na Vostoke* Чума на Востоке (*Persiya* Персия).  
[Plague in the East (Persia)]  
in: *Sbornik sochineniy po sudebnoy meditsine, sudebnoy psikiatrii, meditsinskoj politsii, obshchestvennoy gigiyene, epidemiologii, meditsinskoj geografii i meditsinskoj statistike* Сборник сочинений по судебной медицине, судебной психиатрии, медицинской полиции, общественной гигиене, эпидемиологии, медицинской географии и медицинской статистике [Collection of Works on Judicial Medicine, Forensic Psychiatry, Medical Police, Public Hygiene, Epidemiology, Medical Geography and Medical Statistics] vol. 2: 1-4. (S.-Peterburg С.-Петербург)  
[(plague in Persia) For remark on camel plague, see (149) FEDOROV 1960a: 275.]

### 1890

- (125) GALANIN M.I. ГАЛАНИН М.И.  
1897 *Bubonnaya chuma* Бубонная чума.  
*Ee istoriko-geograficheskoe rasprostranenie, etiologiya, simptomatologiya i profilaktika* ее историко-географическое распространение, этиология, симптоматология и профилактика.  
[The Bubonic Plague, its Historical and Geographical Distribution, Aetiology, Symptomatology, and Prevention]  
St. Petersburg С.-Петербург: N.P. Petrov.  
[(camel plague) see (149) FEDOROV 1960a: 275.]

### 1910

- (126) KLIMENKO V.S. КЛИМЕНКО В. С.  
1910 *Obshchiy ocherk razvitiya epidemii chumy v Ural'skoy oblasti v 1900-1910 gg* Общий очерк развития эпидемии чумы в Уральской области в 1900-1910 гг, [The general outline of the development of the plague epidemic in the Urals region in 1900-1910]  
in: *Trudy s'yezda uchastnikov protivochumnykh meropriyatiy v Astrakhanskoj gubernii i Ural'skoy oblasti* Труды съезда участников противочумных мероприятий в Астраханской губернии и Уральской области [Proceedings of the congress of participants in anti-plague events in the Astrakhan province and the Ural region]  
(Astrakhan' Астрахань.)  
[(camel plague)]

- (127) KLODNITSKY Nikolai Nikolaevich КЛОДНИЦКИЙ Николай Николаевич [1868-1939]  
 \*1911a *K voprosu o roli verbyudov v epidemiologii chumy*  
 К вопросу о роли верблюдов в эпидемиологии чумы,  
 [On the role of camels in the epidemiology of plague]  
 in: Vrachebnaya gazeta Врачебная газета [The Medical Newspaper]  
 1911, No. 47.  
 [(camel plague)]
- (128) \*1912 *K voprosu o vospriimchivosti verbyudov k bubonnoy chume*  
 К вопросу о восприимчивости верблюдов к бубонной чуме,  
 [On the question of the susceptibility of camels to the bubonic plague]  
 in: Vrachebnaya gazeta Врачебная газета [The Medical Newspaper]  
 № 8: 330.  
 [(camel plague)]
- (129) \*1914a *Chuma verbyudov i znachenie yeye v epidemiologii astrakhanskoй chumy* Чума  
 верблюдов и значение ее в эпидемиологии астраханской чумы.  
 [Plague of camels and its significance in the epidemiology of the Astrakhan plague]  
 Trudy s"yezda po bor'be s chumoy i suslikami Труды съезда по  
 борьбе с чумой и сусликами [Proceedings of the congress on combating  
 plague and susliks]. Samara Самара, 1914.  
 [(camel plague)]
- (130) \*1914b *Chuma verbyudov i znachenie yeye v epidemiologii astrakhanskoй chumy* Чума  
 верблюдов и значение ее в эпидемиологии астраханской чумы.  
 [Plague of camels and its significance in the epidemiology of the Astrakhan plague]  
 in: Russkiy vrach Русский врач [The Russian Doctor] 1914.  
 [(camel plague)]
- (131) SCHURUPOFF J.S. [SHUROPOF]  
 \*1911  
 .,.  
 in: Vrach 52, December 31st: ...
- (132) \*°1912 *Ueber die Empfänglichkeit der Kamele für den Mikroorganismus der Bubonenpest,*  
 (Aus dem Laboratorium im Fort Alexander I. in Kronstadt.)  
 in: Centralblatt für Bakteriologie, Parasitenkunde und  
 Infektionskrankheiten, Erste Abteilung, Band 63, Heft 4/6: 333-337.  
 <<https://archive.org/details/centralblattfr63jena>> [pdf]  
 [(camel plague; *Bacillus bipolaris plurisepticus* hypothesis)  
 Rejects Kirghiz emic accounts; offers *Bacillus bipolaris plurisepticus* hypothesis based on 3 failures  
 to cause bubonic plague in camels.  
 • WU Lien-teh 1913: 274: "Moreover, referring to the disease in camels mentioned above, Mr  
 Shuropof, a veterinary surgeon who investigated the possibility of this animal suffering from  
 plague, concluded that the camel was entirely insusceptible to the disease. He thinks that the  
 observations made in the Kirghiz steppes must be received with doubt and that possibly the  
 organism isolated from the dead camel was the *Bacillus bipolaris plurisepticus*, and not the plague  
 bacillus (*Vrach*, No. 52, December 31st, 1911, quoted in *Lancet*, March 9th [179(4619)], 1912,  
 page 688)." The latter being the short notice *Plague in Russia and the Near East*. (From the British  
 Delegate to the Constantinople Board of Health.)  
 <[https://doi.org/10.1016/S0140-6736\(01\)67052-1](https://doi.org/10.1016/S0140-6736(01)67052-1)>

- (133) DEMINSKI I.D., KLODNIZKI N.N., PETROWSKI A.N., FEINSCHMIDT D.L.  
& SCHUKEWITSCH I.L.  
1912 *Untersuchungen über die Erkrankung der Kamele an Pest,*  
in: *Westnik Obschtschestwen. Gigieny.*: 349.  
[(camel plague) apud BERDNIKOW 1913: 259.]
- (134) KOWALEWSKI J.-M. [KOWALEWSKY, KOVALEVSKY КОВАЛЕВСКИЙ]  
[Membre correspondant de la Société de médecine vétérinaire pratique à Paris]  
°1912 *Le Chameau et ses maladies d'après les observations d'Auteurs Russes.*  
in: *Journal de Médecine Vétérinaire et de Zootechnie, Lyon,*  
*Cinquième Série, Tome XV: 462-466 (Août), 540-549 (Septembre),*  
*600-613 (Octobre).*  
<<http://gallica.bnf.fr/ark:/12148/bpt6k9757631p/>> [pdf]  
[(camel plague; Kirghiz/Kyrgyz camel disease names)  
Contenu: 1° Les races de chameaux [en Russie]; 2° Leurs maladies, d'après WIEDORNIKOW  
PETROWSKY; 3° L'étude préliminaire de la maladie analogue à la *Peste bubonique de l'homme*  
chez les caméliens, d'après le mémoire du D<sup>r</sup> KIODUITZKY [sic], d'Astrakan.  
[Note: KIODUITZKY, below written KLODUITZKY, should probably mean (127)(128) KLOD-  
NITSKY КЛОДНИЦКИЙ (?), implying two typos.] –  
1°, 462: “L'élevage des caméliens est surtout pratiqué dans le Sud-Ouest, dans les Gouverne-  
ments d'Uralk, de Samara, d'Orenbourg, d'Astrakan, de Saratow, dans la Transcaucasie, le  
Turkestan russe et en Sibérie.”  
462-464: 5 races:  
a) Le chameau noir à deux bosses nommé *Torriapakk* par les Kirguizes.  
b) Chameau blanc (*ak-tué*).  
c) Le chameau à deux bosses (*Ayguer True*).  
d) Chameau simple à une hosse Dromadaire (*Narr*).  
e) Le Dromadaire de Hiwa (*Loqqé*).  
2°, 464ff.: Peste bovine (rinderpest, viruserkrankung).  
540: Le charbon (anthrax, *Djam datou*).  
541-543: La fièvre aphteuse (*Aoussonne* ou *Sarpéi*).  
543-544: Péripneumonie contagieuse (*Kara-ounke*).  
544-546: Entérite infectieuse (*Tschak*).  
546: Variole (*Yetschyk* ou *Aktantschyx*).  
547-549: Morve du chameau (*Malleus Camelis*).  
600: La rage (*Djynkakkane*).  
600-601: Tuberculose (*Kuksay*).  
602-603: Tuméfaction de la bouche (*Fetsche*).  
603-604: Strongylose.  
604-605: Distomatose (*Djournoun-Kaunte*).  
605: La gale (*Koutour-Akpase*).  
606-607: *Kara-Kourte*. [*kara kurt bié*] — Maladie déterminée, d'après KOWALESKY [sic], par  
une araignée venimeuse qui porte le nom de « Kara-Kourte », parmi les indigènes des steppes  
kirguizes du Turkestan, ce mot signifiant « ver noir ». Cette espèce est plus petite que la  
Tarentule, de couleur noire et velue; elle sécrète un liquide d'une odeur désagréable. Elle tisse  
sa toile sur l'herbe et se nourrit d'insectes, particulièrement de sauterelles. Leur nombre aug-  
mente corrélativement avec celui des sauterelles. (...)  
[Note: • PALLAS Peter Simon 1771, *Reise durch verschiedene Provinzen des Russischen Reichs*, Th. I, p.  
385 (?), 476 Anh. n. 80. Phalangium Calmucc. *Bychorcho*; PALLAS 1776: Th. III, p. 650 Ejusd.  
Spicil. Zool. Fasc. III, F. 7-9 *Die langhaarige, höchstgiftige, milbenförmige Skorpionspinne*. Desselben  
Neue nordische Beyträge, Th. II. p. 345. (apud JÖRDENS)  
PALLAS 1771: 476 “80. PHALANGIVM Miscell. Zool. *inedita*. / Calmucc *Bychorcho*. / *Mole*  
*saepius subaequat Tarantulam*, qua longior. *Abdomen* molle, anulatum, oblongum. *Thorax*  
*vrceolatus*, gibbus, antice truncatus, tuberculoque ad medium marginem prominentissimo,  
occliserio notatus. *Chelae* oris sessiles, venenistuae, magnae, ventricosae, situ verticales, digito  
inferiore mobili. *Brachiae* praetentantia, pedibus maiora, cumque pedibus primi paris mutica,  
apice obtuso terminata. *Pedes* octo; sex postici vnguiculati; postica femora subtus appendiculis  
circiter quinis, triangulis, planis, petiolatis. *Artus* omnes pubescentes, pilisque rarioribus  
praelongis adpersi. *Color* gryseus, chelarum digiti dentati testacei. *Colit* arundineta desertorum  
australium, omnium concensu venenatissimum Insectum.”  
• JÖRDENS Johann Heinrich 1801: *Entomologie und Helminthologie des menschlichen Körpers, oder,*  
*Beschreibung und Abbildung der Bewohner und Feinde desselben unter den Insekten und Würmern*. Hof: bei  
Gottfried Adolph Grau; Band 1, pp. 208-215 *Die spinnenartige Solpuge*, Tab. VIII, fig. 6-10.  
<[https://books.google.ch/books?id=dK3PAQAACAAJ&hl=de&source=gbs\\_navlinks\\_s](https://books.google.ch/books?id=dK3PAQAACAAJ&hl=de&source=gbs_navlinks_s)>

• *Brehms Thierleben. Allgemeine Kunde des Thierreichs*, Neunter Band, Vierte Abtheilung: Wirbellose Thiere, Erster Band: Die Insekten, Tausendfüßler und Spinnen. Leipzig: Verlag des Bibliographischen Instituts, 1884, pp. 631-632, 1 fig., Gemeine Walzenspinne (*Solpuga araneoides*) <<http://www.zeno.org/nid/20007974965>> “[631] PALLAS erzählt wunderliche Dinge von unserer Walzenspinne, welche in den südrussischen Steppen, im Lande der Kalmücken, *Bû-Chorgoi* (Zauberwurm) oder *Mandschi-Bû-Chorgoi* (gemeiner Zauberwurm) und der Kirgisen *Kara-Kurt-Bie* genannt, nicht minder gefürchtet wird, als anderwärts die Skorpione. Man verläßt die Gegend, in welcher sich öfters das für Menschen und deren Herden gefährliche Thier gezeigt hat. Wenn sich die Kamele und Schafe, welche im Sommer dort nackte Bäuche haben, zur Ruhe niederlegen, so finden sich diese Bestien ein, springen an sie und schlagen ihre jedenfalls das Gift enthaltenden Scheren dort ein. Der Bauch schwillt an und nicht selten gehen die gebissenen Thiere an der Vergiftung zu Grunde. Da sich die Walzenspinnen gern zwischen Schilf aufhalten, so kommen sie mit diesem in die daraus erbauten Hütten und mit den Menschen in nähere Berührung, als sie selbst beabsichtigen, verkriechen sich gleich den Skorpionen in die Kleider und führen überhaupt ganz deren Lebensweise. / Nach dem Aberglauben der Kalmücken muß die Milch einer Frau, welche ihr erstes Wochenbett abhält und – als Mädchen keusch lebte, oder, in Ermangelung dieses Mittels Lunge und Herz, welche einem lebendigen, *schwarzen* Thiere (Hund, Katze) aus dem Leibe gerissen worden sind, auf die Bißwunde gelegt werden, um die Vergiftung zu heilen. Von den Ärzten in Sarepta wurden zu PALLAS’ Zeiten Einreibungen von Nußöl oder mit Kampher gesättigtem Baumöle erfolgreich angewendet. Der Biß ist ungemein schmerzhaft, erzeugt starke Entzündung, vorübergehende Lähmung, Kopfweh, Ohnmacht.”]

607-608: Rhumatisme musculaire. — Le surnom Kirguize est « Segtschyte ».

608: Maladie du sabot.

3°, 608-619: **Peste bubonique à forme pulmonaire.** *Pestis buboniba forma pulmonaris camelli*, d’après le Dr KLODUIZKY (Astrakan).

609-611: “Enfin on a montré que les chameaux des steppes Kirguizes sont propagateurs de la peste humaine. / Mais ceci a soulevé une vive opposition de la part du docteur-vétérinaire SCHOUROPOW [(132) SCHURUPOFF 1912] qui avait proclamé que les chameaux étaient réfractaires à l’inoculation de la maladie. Cependant, quelques faits historiques rapportés par GALAMINE et KLIMENKOW sont intéressants. / Le premier dit avoir observé la peste sur des Arabes ayant ingéré de la chair de chameau. / En 1907, le Dr KLODUIZKY rapporte trois cas de mort de femmes kirguizes, après le sacrifice d’un chameau soupçonné atteint de charbon. L’examen bactériologique des viscères d’une des femmes a donné une culture de peste. Malheureusement, le cadavre du chameau ne put être soumis à l’examen bactériologique. / KLIMENKOW dit avoir observé la peste chez des Kirguizes qui avaient sacrifié un chameau et fait subir diverses manipulations au cadavre. / De tout ceci, il résulte qu’il existe un lien entre la maladie du chameau et la peste bubonique. / Des travaux d’une Commission à Astrakan ont montré que les matériaux virulents recueillis sur les chameaux étaient caractéristiques de la peste. De même les travaux de METCHNIKOW de Paris, et de ZABOTOTUYI à Pétersbourg aboutissent aux mêmes conclusions. / D’après KLODUIZKY, on possède trois points où les recherches sont positives. / Avant de présenter la description des trois cas de peste nous donnerons une idée générale du tableau clinique et anatomique de la maladie. / Dans un cas, la maladie sévissait à l’état suraigu, la mort arrivait en deux ou trois jours sur un animal de grande taille et bien nourri. Dans d’autres cas, la durée était de quatre à huit jours. La température, la veille de la mort, était de 39°5 et les animaux toussaient. / Il est intéressant à noter que chez l’homme la durée est pareille; les deux maladies seraient identiques[.] Néanmoins, un cas de peste du chameau a duré tout l’été, d’où ce processus pathologique peut évoluer à l’état chronique.

ANATOMIE PATHOLOGIQUE. — L’autopsie montre que les chameaux malades présentaient des lésions il peu près analogues à celles de l’homme, sauf quelques-unes plus accentuées. / Les lésions constatées rappellent celles de la septicémie aiguë. / Les séreuses (plèvres, péritoine), de couleur presque noire, montrent de nombreuses hémorragies. Le poumon prend un aspect bigarré grâce à la présence de pétéchies; son parenchyme est plus consistant; il se laisse inciser facilement; l’incision laisse écouler de l’oedème un liquide de couleur gris rougeâtre. / La plèvre montre, de-ci de-là, des fausses membranes. La rate est hypertrophiée, ramollie.

EXAMEN BACTÉRIOLOGIQUE. — (...) 2° Le bacille de la peste (*B. Pestis*) en quantité restreinte. (...)

611-613: “Sur les trois localités où fut observée la peste. / a) SAGUANAY. On observe deux chameaux malades. Le premier fut sacrifié et sa chair mangée par les Kirguizes; les Sultanoff, auxquels il appartenait, ont le plus souffert. Le deuxième cas est présenté par une chamelle appartenant à une famille kirguize, dont deux membres sont décédés à la suite de la peste. / L’animal fut malade sept jours. Le seul symptôme observé fut la toux. Une émulsion des organes de ce chameau injectée à des témoins provoqua leur mort. Desensemencements de leur sang et organes donnaient dans le bouillon très troublé des cultures contenant des bacilles mobiles. En injectant cette culture au cobaye, on obtient une culture pure de la peste. /

b) AKTSCHAGYL. — On observe dans cette localité la mort d’une chamelle après trois jours de maladie. Personne parmi la famille à laquelle elle appartenait n’est incommodé, et

même le vétérinaire SAZANONE qui en fit l'autopsie, se coupa et ne présenta rien après s'être désinfecté au sublimé. / L'ensemencement donne les mêmes résultats que précédemment. / Si on inocule le virus en petite quantité ou qu'on frictionne délicatement la région abdominale avec le virus, on obtient une culture pure de la peste. Si on prend plus de virus ou qu'on traumatise la peau, les organes des témoins morts ne donnent pas de culture pure. /

c) AGGROTA. — A la fin de novembre 1911, à Aggrota, on constate deux cas de mort suspecte parmi les Kirguizes. La Commission médico-vétérinaire a recueilli les faits suivants: / Un Kirguize confia à un autre nommé Issine un chameau pour que celui-ci soit mis dans les steppes. / Issine, voyant le chameau dépérir de plus en plus, décide de le sacrifier et convia le propriétaire, sa femme et son fils à assister à la cérémonie. Ces derniers partirent le soir avec la chair, mais celle-ci fut confisquée par le Gouverneur. / Issine devint malade deux jours après l'abattage et mourut le troisième jour; sa femme mourut trois jours après. / L'autopsie de la femme montrait qu'elle était décédée des suites de la forme pulmonaire de la peste. / On obtint une culture pure de la peste provenant du matériel recueilli sur la femme et le chameau.”

613: “Conclusions. — Des recherches accomplies dans le Laboratoire de bactériologie d'Astrakan il résulte que:

1° On observe chez les chameaux une maladie provoquée par le microbe de la peste bubonique.

2° Des inoculations de virus dans la plèvre et le conjonctif sous-cutané des chameaux restent négatives;

3° La contagion spontanée ne peut se faire qu'autant que les chameaux se montrent dans un état de moindre défense;

4° La transmission de la peste peut se faire du chameau à l'homme.

Quoique les caméliens représentent un capital respectable, les données sur leurs maladies sont pauvres. En littérature vétérinaire, on ne possède qu'un petit traité d'anatomie du chameau de NOWOPALSKY, et les travaux de WIEDIERNIKOW sur les races, l'exploitation des caméliens, et enfin les travaux de TARTANOWSKY. (...)” [Note: No references given throughout article.]

• TARTAKOWSKY, M.M. 1899. No Title. Arch. Sci. biol., St. Petersburg 8: 11.]

(135) SACQUÉPÉE & GARCIN [médecins-majors de l'Armée métropolitaine]

1913

*La peste des Ouled Fredj (Maroc). La peste des animaux domestiques.*

*Remarques sur la contagion de la peste et sur sa prophylaxie,*

in: Archives de médecine et de pharmacie militaires 62: 561-579.

[(plague in Morocco, 1911-12; camel plague; domestic animals)

Cited by (151) RUTTER & MACK 1963.

Domestic animals found with plague: camel; sheep, lamb, mule, cat.]

Veterinary Bulletin 33(3): 119-124.

• J.H.S 1914, in: Tropical Diseases Bulletin 3: 203.

<<https://archive.org/details/in.ernet.dli.2015.25874>>

(excerpt) “The human epidemic is apparently bubonic in type [this is not definitely stated], and *B. pestis* was found in the glands, but a striking feature was the infection of domestic animals. Two camels (one examined 24 hours after death), a sheep, a lamb, a mule (found dead), and a cat were all found infected with organisms recognised as *B. pestis* [no indication of the method of diagnosis], and the authors were convinced without having any actual proof that dogs and probably cattle also were attacked. Rats, on the other hand, were apparently scarcely attacked. No signs of unusual rat-mortality were found, and of 102 [caught alive?] fully examined, only one was found to contain *B. pestis*. The authors conclude that a rat epizootic played no part in the spread of the human disease in this region. It is conveyed from man to man, they believe, chiefly through the agency of fleas, which the habits of the people give every opportunity of passing from one man to another or from man to animals.” –

• Annales d'hygiène et de médecine coloniales 1914, n° 17: 321-322. (full text below)

résumé:

reviews:



**La peste des Ouled-Fredj (Maroc). — La peste des animaux domestiques. — Remarques sur la contagion de la peste et sur sa prophylaxie**, par MM. SACQUÉPÉE et GARCIN, médecins-majors de l'Armée métropolitaine. (*Archives de médecine et de pharmacie militaires*, décembre 1913.)

Pendant l'épidémie de peste de 1911-1912, au Maroc, Sacquépée et Garcin ont fait des observations qu'ils ont groupées sous trois titres : «La peste chez les divers animaux; Remarques sur l'étiologie; Remarques sur la prophylaxie».

*Peste chez les animaux.* — L'épidémie sévissant chez les Ouled-Fredj était nettement pesteuse, ce qui est démontré par la découverte du bacille d'Yersin dans les bubons des malades. En recherchant l'étiologie de la maladie, Sacquépée et Garcin ont constaté la peste chez divers animaux : le chameau, le mouton adulte, l'agneau, le mulet, le chat. En revanche, sur 4,249 rats capturés au cours de l'application des mesures prophylactiques, «aucun de ces animaux ne présentait de lésion apparente, bubon ou ulcération, de nature à faire suspecter l'existence d'une infection pesteuse».

*Étiologie de la peste.* — Dans l'épidémie des Ouled-Fredj les rongeurs n'ont joué aucun rôle dans la contagion; ce qui est intervenu surtout, c'est la contagion interhumaine et probablement aussi la contagion par les animaux domestiques. Cette étiologie de l'épidémie des Ouled-Fredj est démontrée par le mode de propagation de la maladie et par le mode d'existence des populations marocaines. Les

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322

BIBLIOGRAPHIE.

indigènes s'entassent dans les douars, et le petit domaine familial donne en outre asile aux animaux domestiques les plus variés. Entre les personnes et les animaux il existe des contacts incessants, d'où contamination facile, soit par les insectes piqueurs, par contact direct avec des érosions ou plaies, par contact indirect, après souillure des vêtements, du linge, etc., soit par l'intermédiaire des mouches qui disséminent le bacille.

La peste des animaux domestiques est souvent subaiguë, ce qui permet la survie du bacille.

*Prophylaxie.* — En milieu indigène la destruction des insectes est irréalisable. La poudre de pyrètre permet de les éloigner. Comme prophylaxie spécifique, Sacquépée et Garcin se sont bien trouvés de la séro-vaccination, consistant en une injection simultanée de 10 centimètres cubes de sérum et 1 centimètre cube de vaccin.

Les auteurs terminent leur intéressant article sur l'épidémie de peste qu'ils ont observée chez les Ouled-Fredj par les conclusions suivantes :

«La contagion s'est opérée surtout d'homme à homme par l'intermédiaire des insectes. Les rats n'y ont joué aucun rôle appréciable. Les animaux domestiques infectés sont sans aucun doute susceptibles d'infecter l'homme.

«La prophylaxie doit se préoccuper non seulement des rats et des insectes mais encore des animaux domestiques.»

(136) PÖCH Rudolf [Prof. Dr., Wien]

°1914

*Die Pest,*

in: MENSE Carl (ed.) 1914<sup>2</sup>: *Handbuch der Tropenkrankheiten*. Zweite Auflage. Dritter Band. Mit 118 Abbildungen im Text und 9 farbigen Tafeln. Leipzig: Johann Ambrosius Barth, pp. 103-157, 4 figs., mit Tafel V. <<https://archive.org/details/b28136056>> [pdf]

[(handbook entry)

114-124: Epidemiologie. 121-122: *Tarbaganenpest, Pest sonstiger Nagetiere, Verhalten der übrigen Säugtiere zu Pestzeiten.*

122: "Das baktrische Kamel ist beschuldigt, daß es Pest übertragen kann und daß man durch Genuß infizierter Tiere an Pest erkrankt; der bakteriologische Beweis ist jedoch nicht erbracht."]

1920

(137) NIKANOROV Sergey Mikhaylovich Никаноров Сергей Михайлович

[NIKANOROFF, NIKANOROW, ob. 1930]

\*1922

*К вопросу о роли верблюдов в эпидемиологии астраханской чумы* К вопросу

о роли верблюдов в эпидемиологии астраханской чумы —

*Rôle du chameau dans l'épidémiologie de la peste d'Astrakhan,*

in: Vestnik mikrobiologii i epidemiologii Вестник микробиологии и эпидемиологии • Revue de microbiologie et d'épidémiologie I(2): 89-128, 178-179. (Saratov Саратов)

[(camel plague; role of camels in plague in Astrakhan) Cited by (170) KLEIN J.-M. et al. 1975.]



(138) \*1926a

*Die Rolle der Kamele in der Epidemiologie der Astrachaner Pest.*

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Analyse du Bulletin mensuel de l'O.I.H.P., novembre 1926: 1318.]



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colonial 27(5): 411-434. (Madrid) Speicherbibl. Kollektiv UBH Mak Zs 193  
[(camel plague; *loleisis*) (170) KLEIN Jean-Marie *et al.* 1975: 203 “La peste du dromadaire est  
bien connue des nomades du Sahara sublittoral sous le nom de « *Loleisis* », terme qui a déjà  
été signalé par Piedrola Gil (29) au Rio de Oro et qui s’applique aussi à la maladie bubonique  
humaine.” – R(?) not *loasis*.]
- (142) LOBANOV Vladimir Nikolayevich ЛОБАНОВ Владимир Николаевич  
\*1959 [*Pathology of experimental plague in camels,*  
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resumé: Veterinary Bulletin 30, abst. 24.
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Методическое руководство по борьбе с чумой у верблюдов.  
Sost. prof. V. N. Lobanovym sost. проф. В. Н. Лобановым.  
[*Methodical Guide to Combat Plague in Camels.*  
Handbook compiled by Prof. V. N. LOBANOV.]  
(M-vo zdravookhraneniya SSSR M-vo здравоохранения СССР.  
Vsesoyuz. nauch.-issled. protivochumnoy in-t “Mikrob” Всесоюз.  
науч.-исслед. противочумный ин-т “Микроб”)  
Saratov Саратов: s.n. [76p.; ill.] RSL FB Br 81/1330 FB Br 81/1331  
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Центр. ин-т усовершенствования врачей, mezhregional’nyy  
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*Maloizvestnye zaraznye bolezni zhivotnykh Малоизвестные заразные болезни животных [Little-known contagious diseases of animals].*  
 Moskva: Sel'khozgiz Сельхозгиз, pp. 262-280.  
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 [(camel plague)]

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 in: Bulletin of the World Health Organization 23(2-3): 275-281,  
 1 table. <<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2555595/>>  
 [(camel plague experiments, 1954-56, USSR)  
 Abstract: In 1954-56 a series of experiments was carried out in Central Asia, under the guidance of the author, in which camels were infected with plague by infesting them with *Ixodes* and *Argas* ticks which had previously fed on plague-infected laboratory animals. Subcutaneous, intradermal and intravenous injection was also used. The experiments showed that the camels varied markedly in their susceptibility to plague, which in any case was relatively low. / Special investigations on plague prevention in camels are also reported. Vaccination with dried live vaccine injected in a single dose of 30 000 million organisms created a sufficiently high degree of immunity in adult animals. Spraying of the camels' coats with insecticide is also recommended. –  
 275: "In this connexion it is worth mentioning that in early Russian books on plague ([125] Galanin, 1897) there is a reference to a report by a Dr Kuzminski [124] of the Russian Mission to Teheran, discussing an epidemic of plague in Mesopotamia in 1876, in which the following observation is made: "Plague was discovered first of all in the tents of one nomad Arab tribe immediately after the meat from a slaughtered camel had been eaten". Naturally at that time nobody attached serious significance to the fact, although Sticker (1908), in his authoritative work on the history of plague, is apparently referring to the possibility of such infection when he describes the disease in settlements near Baghdad in 1876: "A striking fact was the death of a camel in one place before an outbreak of human plague. The Arabs often saw in the death of these animals a presage of the plague."  
 276: "The accumulation of stocks of blocked fleas was an exceptionally arduous task, since to select the required quantity of blocked specimens, 29 972 live plague-infected fleas had to be examined under the microscope in the course of our work."

278: "On the basis of the individual nature of susceptibility to plague thus established, which clearly did not depend on the age, sex or state of nutrition of the animals, it must be presumed that in nature camels are infected with plague considerably more frequently during an epizootic among rodents, but that in many cases they do not die of the disease, since it follows a mild course ending in recovery. All in all, the percentage of highly susceptible animals in a herd which die of plague is quite insignificant and this explains the comparative rarity with which cases of camels developing plague under natural conditions are reported."]

(150) \*1960b

*K izucheniyu mekhanizma zarazheniya verblyudov chumoy* К изучению механизма заражения верблюдов чумой,  
[Study of the infection mechanism of camel plague]  
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[Problems of natural foci and epizootic plague in Turkmenistan]  
Ashkhabad Ашхабад: ..., pp. ...  
[(camel plague experiments, 1954-56, USSR, Turkmenistan)]

⇒ AKIYEV A.K. & FENYUK B.K.

1965

*Vladimir Nikolayevich Fedorov (1898-1964)*. (Obituary) [(in Russian)]  
in: NIKOLAYEV N.I.(ed.) 1965: *Questions of Microbiology and the Laboratory Diagnosis of the Dread Diseases*. (Collection of the Scientific Efforts of Anti-Plague Organizations)  
Saratov: Privolga Press, pp. 340-343.  
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⇒ AKIYEV A.K. & YUNDIN Ye.V.

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*Vladimir Nikolayevich Fedorov*, (Commemorating 70th Birthday) [(in Russian)]  
in: *Problems of the Dread Diseases*, Issue 6(10), pp. 239-241.  
[(2) KONEVA Z.A. et al. 1975: no. 24.]

(151) RUTTER T.E. Gatt & MACK R.

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[CAB Abstract: This review includes notes on epizootic lymphangitis (*Histoplasma farciminosum*), contagious skin necrosis (syn. streptothricosis) attributed to *Nocardia cameli*, and pulmonary streptothricosis (*Actinomyces cameli*).  
Indexing terms for this abstract: Organism descriptor(s) : *Actinomyces*, *Camelus*, *Histoplasma*, *Histoplasma farciminosum*, *Nocardia*  
Descriptor(s): animal diseases, bacterial diseases, infections, lungs, lymphatic diseases, necrosis  
Identifier(s): *Actinomyces cameli*, bacterial infections, bacterioses, bacterium, camels, epizootics, fungus, *Nocardia cameli*  
Broader term(s): Actinomycetaceae, Actinomycineae, Actinomycetales, Actinobacteridae, Actinobacteria, Bacteria, prokaryotes, Camelidae, Tylopoda, Artiodactyla, mammals, vertebrates, Chordata, animals, eukaryotes, Ajellomycetaceae, Onygenales, Eurotiomycetes, Pezizomycotina, Ascomycota, fungi, *Histoplasma*, Nocardiaceae, Corynebacterineae.]

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Экспериментальная чума верблюдов, вызванная *Bact. pestis*.  
[*Experimental plague in camels caused by Bacteria pestis*]  
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Современные данные эпизоотологии и профилактики чумы у верблюдов,  
[Contemporary Data on the Epizootology and Prophalaxis of Plague in Camels]

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 [(*Camelus bactrianus*, camel plague, USSR)  
 (automatic tr.) "Bubonic form (Figure 1) is characterized by the defeat of both internal and  
 external lymph nodes. They are enlarged in volume and painful. Fiber, surrounding the  
 lymph nodes, edematous. Body temperature increased (39-40°). With a long febrile period,  
 remissions are noted when the body temperature drops to normal. Sick animals are depressed,  
 appetite worsens or completely disappears, the chewing gum stops. On some days, the general  
 condition of animals deteriorates, the pulse becomes frequent, weak, arrhythmic, camels lie  
 more. When the lymph nodes of the limbs are affected, lameness to the corresponding limb is  
 observed, the gait becomes connected, the patients lie down and stand up. In some cases, the  
 bubonic form is complicated by sepsis or the lungs are involved in the process (secondary  
 pneumonia)."]



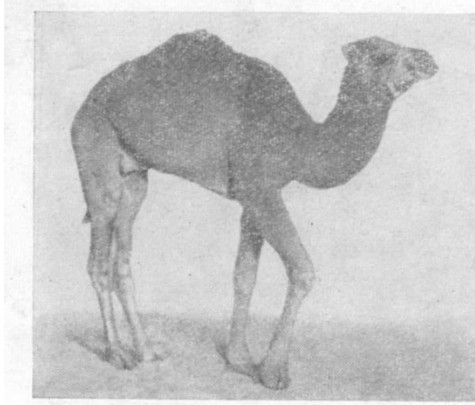


Рис. 1. Чума: бубон под правой лопаткой. (Оригинал).



Рис. 2. Септическая форма чумы. Подострое течение.

Fig. 1: Plague: bubo under the right shoulder blade. (Original).

Рис. 1. Чума: бубон под правой лопаткой. (Оригинал).

Pis. 1. Chuma: bubon pod pravoy lopatkoj. (Original).

<<http://zhivotnovodstvo.net.ru/m/ChUMA-VERBLYuDOV-bubon-28.jpg>>

Fig. 2: Septic form of the plague. Subacute current.

Рис. 2. Септическая форма чумы. Подострое течение.

Pis. 2. Septicheskaya forma chumy. Podostroye techeniye.

<<http://zhivotnovodstvo.net.ru/m/ChUMA-VERBLYuDOV-septycheskay-29.jpg>>

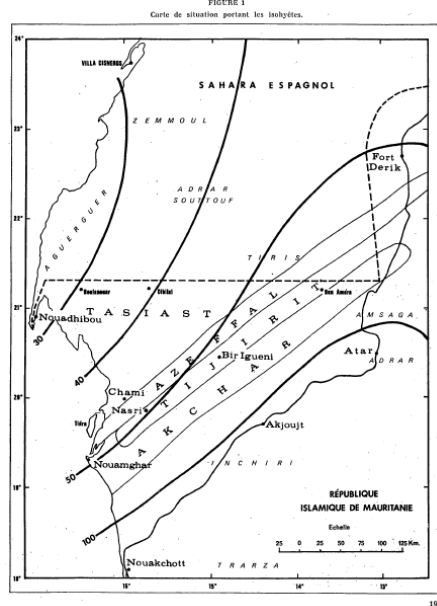
## 1970

- (168) AKIYEV A.K., GOLKOVSKIY G.M. & EKSTREM N.V.  
 1970 *[The Role of Camels in the Epidemiology of Plague,*  
 in: Public Health of Turkmenistan, No. 6, pp. 31-35.] [(in Russian)]  
 [(camel plague) (2) KONEVA Z.A. *et al.* 1975: no. 1686.]
- (169) ALONSO Jean-Michel  
 1971 *Contribution à l'étude de la peste en Mauritanie.*  
 Paris: Université de Paris VI, Pitié-Salpêtrière.  
 [Thèse pour le Doctorat en médecine, (Diplôme d'État), 1971, no 59, par ALONSO Jean Michel.]  
 [Acc. (185) MALEK, BITAM & DRANCOURT 2016: 4 "Four patients with adenitis were in close contacts with cattle, including five sheep with superficial adenitis in the Al Mounek camp."]
- (170) KLEIN Jean-Marie, ALONSO Jean-Michel, BARANTON G., POULET A.R.  
 & MOLLARET Henri-Hubert  
 °1975 [pdf] *La peste en Mauritanie,*  
 in: Médecine et Maladies Infectieuses 5(4): 198-207, 1 map.  
 <[http://horizon.documentation.ird.fr/exl-doc/pleins\\_textes/pleins\\_textes\\_5/b\\_fdi\\_06-07/08196.pdf](http://horizon.documentation.ird.fr/exl-doc/pleins_textes/pleins_textes_5/b_fdi_06-07/08196.pdf)>  
 [(plague epizootics, Mauretania, 1963, 1967; camel as intensifying factor for plague infection of humans, and as probable origin of plague introduction to Mauretania; camel plague: *loleisis*)  
 Summary: The authors analyse the historical data about infectious episodes, of undoubtedly plague epizootics and epidemics, which happened in Mauritania in 1963 and 1967, as well as in Rio de Oro in 1953. / Their recent findings on ecology of desert rodents and their fleas in a natural focus of plague in sublittoral Azefâl – in Mauritania – are summarised. A synthesis of our present knowledge about the epidemiology of plague in West Sahara is carried out. The main enzootic factors are: 1) the dry subdesertic climate; 2) the subarid steppe landscape; 3) the desert rodents; 4) the rodent flea; 5) the nomad population and the livestock of camels. / The gerbils are recognized as main carriers of plague and their fleas, *Synosternus cleopatrae*, as a main vector species. / As there are no human ectoparasites among the nomads, and no pneumonic plague under desert climate, the camel is the only factor, which intensifies the epidemicity of plague infection in Mauritania. It is responsible of the direct human contamination and of the outbreak of the infection in small foci of human plague. The camel is also probably at

the origin of plague introduction in Mauritania, as the importation by sea is not likely. Keywords: Plague - Epidemiology - Flea - Rodent - Camel.

Abstrait: L'infection, qui sévit par intermittence au Sahara subatlantique chez les rongeurs, les animaux sauvages et domestiques et qui donne lieu à de petites épidémies d'adénopathies fébriles graves chez les nomades, est indubitablement de nature pesteuse. L'isolement d'une souche de *Yersinia pestis* d'un bubon de dromadaire, lors de l'épizootie de Nasri en 1967 (Goudinearc et coll., 1967, non publié), le confirme (a). / (a) L'identification bactérienne a été effectuée par le Professeur Saurat et le Docteur Chantal à l'École Vétérinaire de Toulouse et confirmée à l'Institut Pasteur de Paris. (30 refs.)

203: "La grande fréquence des bubons sous-maxillaires et en général cervicaux, qui est signalée dans les rapports concernant les trois épisodes du Rio de Oro, de Bir Iguéni et de Nasri, témoigne en faveur d'une contamination par la voie muqueuse, qu'elle soit buccale, pharyngée, nasale ou oculaire. Cette contamination peut être provoquée par les mains souillées ou par l'alimentation. Ainsi Piedrola Gil ne signale que des bubons cervicaux ou axillaires. L'enquête effectuée par Ferrus (14) à Bir Iguéni rapporte que les 9 malades décédés et un enfant traité et guéri présentaient tous des bubons cervicaux. Bres (11) le signale également pour tous les cas de Bir Iguéni dont il est informé (11 décès), ainsi que celui d'un enfant, qu'il a observé et traité."



- (171) YAO Kecheng 姚克成 (*yi zhu* 譯著), HE Jianguo 賀建國, ZHANG Haijun 張海峻, ZHANG Zhongsheng 張忠勝, SHEN Yue 審閱

°1979 [pdf] *shuyi ziran yiyuanxing* 鼠疫自然疫源性. [Plagues' Natural Focality]  
n. pl.: Jilinsheng difangbing di yi fangzhi yanjiusuo 吉林省地方病  
第一防治研究所. [(2)+6+3+237p.; ills.]

[(natural focality of plague; natural foci; Soviet-style landscape epidemiology)  
Appendices: 188-223: Appendix 1: 188-218 *Rodents, and other mammals* (184 entries);  
219-223 *Other mammals* (29 entries);  
224-237: Appendix 2: *Fleas and other ectoparasites* (147 entries).  
223: no. 25, *Camelus bactrianus* L. & no. 26, *Camelus dromedarius*.]

## 1980

- (172) CHRISTIE A.B., CHEN T.H., ELBERG Sanford S.  
°1980 [pdf] *Plague in Camels and Goats: Their Role in Human Epidemics*,  
in: *The Journal of Infectious Diseases* 141(6): 724-726, 1 table.  
<<https://doi.org/10.1093/infdis/141.6.724>>

[(plague in camels, goats, plague due to camel meat consumption in Libya, 1976)  
– See also (178) ARBAJI *et al.* 2005.

Abstract: In 1976, in a small, remote Libyan village, one apparently sick camel was slaughtered and skinned, and the camel meat was distributed for human consumption. A few days later, 15 villagers suffered a severe febrile illness. Of the five individuals who had participated in the

killing and dispensation of the camel, all were dead within four days. When samples of serum from nine of the remaining patients were examined, seven were found to be positive for plague as determined by the passive hemagglutination test. Another six persons became ill after killing two goats, and the serum of one goat contained antibodies to *Yersinia pestis*. Because all of the remaining patients except one were treated early enough, they recovered. These incidents confirm previous reports that the camel and the goat are susceptible to naturally occurring plague infection and have a significant role in the dissemination of human plague.]

- (173) KHAMZIN S.M. ХАМЗИН С.М., IVANOV V.S. ИВАНОВ В.С.  
1981 *Chuma u verblyudov i yeye profilaktika v prirodnykh ochagakh*  
Чума у верблюдов и ее профилактика в природных очагах  
[Plague of camels and its prevention in natural foci],  
in: Profilaktika Osobo Opasnykh Infektsiy Профилактика Особо  
Опасных Инфекций [Prevention of Particularly Dangerous Infections].  
Алма-Ата Алма-Ата: 138-140.  
[[camel plague]]
- (174) SHISHKOV V.P. В.П. ШИШКОВ. (chief ed.)  
'1981 *Veterinarnyy entsiklopedicheskiy slovar'*  
Ветеринарный энциклопедический словарь.  
[Veterinary Encyclopedic Dictionary]  
Moskva: "Sovetskaya Entsiklopediya" "Советская Энциклопедия".  
Online ed. • Entry: *Chuma verblyudov* Чума верблюдов.  
[Camel Plague • *Pestis camelorum*] [doc, 2 figs.]  
<<http://sbiblio.com/biblio/content.aspx?dictid=64&wordid=733922>>
- (175) MCGRANE J.J. & HIGGINS A.J.  
°1985 [pdf] 6. *Infectious Diseases of the Camel: Viruses, Bacteria and Fungi*,  
(The Camel in Health and Disease)  
in: British Veterinary Journal 141: 529-547, 6 figs.  
[[camel plague] after (167) SOTNIKOV 1973 (Engl. review 1974), and HIGGINS 1985.  
540-541: "Camels are also susceptible to *P. pestis* infection. Sotnikov (1974) reported camel  
plague occurring as isolated foci in Mongolia, China, India, Iran, Iraq, Africa and the USSR.  
The bubonic, septicaemic and pneumonic forms are found in camels. The incubation period  
is one to six days and death usually occurs within 20 days. Fleas, which are the vectors incriminated in the transmission of the disease from animal to animal, must be controlled in the event of an outbreak (Higgins, 1985). "]
- (176) MUSTAFA I.E.  
°1987 [pdf] *Bacterial diseases of dromedaries and Bactrian camels*,  
in: Revue scientifique et technique – Office international des  
épizooties 6(2): 391-405.  
<[http://qu.edu.iq/el/pluginfile.php/55507/mod\\_resource/content/1/Bacterial  
diseases.PDF](http://qu.edu.iq/el/pluginfile.php/55507/mod_resource/content/1/Bacterial_diseases.PDF)>  
[[camel plague, bacterial diseases of Camelids]  
Summary: The literature on bacterial diseases of camels is reviewed, with special reference to  
anthrax, brucellosis, haemorrhagic septicaemia, plague, salmonellosis, tuberculosis, paratuberculosis,  
leptospirosis and clostridial infections. Keywords: Bactrian camel - Bacterial diseases -  
Camels - Dromedary - Reviews. (119 refs.) (Sudan Agricultural Research Council, Khartoum,  
Sudan)  
394: on camel plague, quoting (148) STROGOV 1959; (167) SOTNIKOV 1973; (135) SAQUÉPÉE  
& GARCIN 1913; (151) RUTTER & MACK 1963; (156) MARTYNCHENKO 1967b; (142)(145)  
LOBANOV 1959, 1967; (139) KOROBKOVA 1946; (134) KOWALEWSKI 1912; (149) FEDOROV  
1960a.]

1990

- (177) RIVKUS Yu.Z. РИВКУС Ю.З., КНОТ'КО N.I. ХОТЬКО Н.И.  
1994a *Kolichestvennaya otsenka veroyatnosti zarazheniya cheloveka ot chumnogo verblyuda*  
Количественная оценка вероятности заражения человека от  
чумного верблюда [A Quantitative Estimate of the Probability of Human  
Infection from a Plague Camel],  
in: Problemy Osobo Oporasnykh Infektsiy Проблемы особо опасных  
инфекций [Problems of Particularly Dangerous Infections] 4: 36-41.  
[(camel plague)]

2000

- (207) WERNERY Ulrich, KAADEN Oskar-Rüger  
°2002<sup>2</sup> [pdf] *Infectious Diseases in Camelids*. 2nd, revised and enlarged edition.  
With 179 figures and 62 tables.  
Berlin; Vienna: Blackwell Science.  
[xiii+404p.; ISBN 3-8263-3304-7; first ed. 1995.]  
<[https://books.google.ch/books?id=k\\_mh\\_mCIPXQC&hl=de&source=gbs\\_navlinks\\_s](https://books.google.ch/books?id=k_mh_mCIPXQC&hl=de&source=gbs_navlinks_s)>  
<<https://www.academia.edu/12139706/>>  
[54-55: 1.1.6 Camel Plague.]
- (178) ARBAJI A., KHARABSHEH S., AL-AZAB S., AL-KAYED M., AMR Z.S., ABU BAKER M.  
& CHU M.C.  
°2005 [pdf] *A 12-case outbreak of pharyngeal plague following the consumption of camel meat,  
in north-eastern Jordan*,  
in: *Annals of Tropical Medicine & Parasitology* 99(8): 789-793,  
2 tables. <<http://dx.doi.org/10.1179/136485905X65161>>  
[(pharyngeal plague after camel meat consumption, Azraq ad-Druze, Jordan, 1997)  
– See also (172) CHRISTIE *et al.* 1980; (179) BIN SAEED *et al.* 2005.  
Abstract: Between late January and early February 1997, an outbreak of plague, associated  
with cervical lymphadenopathy and fever, occurred in the Jordanian village of Azraq ad-  
Druze, which lies about 50 km west of the border with Saudi Arabia. The 12 cases who pre-  
sented at hospital were initially assumed to have tularaemia, and all were successfully treated  
with gentamicin. When, however, their sera were tested for evidence of *Yersinia pestis* or  
*Francisella tularensis* infection (using haemagglutination, enzyme immuno-assays for specific  
IgM or the F1 antigen of *Y. pestis*, and micro-agglutination tests), all 12 were found to have  
anti-*Y. pestis* IgM. Three dogs shot near the Saudi Arabian border were also found seropositive  
for antibodies against *Y. pestis*. Eleven of the 12 patients reported that, 2-4 days before their  
symptoms appeared, they had eaten the meat cut from the carcass of the same camel, either  
raw (10 cases) or cooked (one case). All 12 patients were diagnosed as cases of pharyngeal  
plague (the first cases of plague reported in Jordan for more than 80 years), caused by *Y. pestis*  
that most had acquired when they ate raw meat from a camel that was infected with the  
pathogen. –790-791: “Human Cases / The investigation of the Azraq ad-Druze outbreak  
began in February 1997 when an 8-year old boy from the village was admitted, with membra-  
nous pharyngitis associated with high fever and cervical lymphadenopathy, to the outpatient  
clinic at the hospital in Zarqa. The preliminary diagnosis was diphtheria but this was put in  
doubt within a few days, when the boy’s parents and 10 other villagers presented at the hospi-  
tal, all with similar symptoms (Table 1). Twelve of the villagers were admitted (one patient  
only had mild pharyngitis that did not necessitate admission). Within 72 h of their admission,  
11 of the hospitalized patients were found to be febrile ( $\geq 39^{\circ}\text{C}$ ) and to have bilateral cervical  
lymphadenopathy, each enlarged lymph node reaching the size of a small hen’s egg. Two of  
the patients underwent appendectomy shortly after admission. Another of the patients develop-  
ed pneumonia after one of his cervical lymph nodes drained. Based on the clinical manifesta-  
tions, the infection was diagnosed as tularaemia. All 12 hospitalized patients and the villager  
with mild pharyngitis (who was never confirmed as a true case of plague) were treated with  
gentamicin and all made uneventful recoveries.”  
791: TABLE 1. The symptoms recorded among the 12 confirmed cases of pharyngeal plague
- | Symptom     | No. of cases affected |
|-------------|-----------------------|
| Fever       | 11                    |
| Sore throat | 11                    |

General weakness	11
Headache	11
Painful neck swelling	10
Arthralgia/myalgia	10
Abdominal pain	6
Vomiting	6
Cough	5
Dysphagia	2
Diarrhoea	2
Haemoptysis and dyspnoea	1

792: (custom of raw meat/raw liver consumption) “Amongst the Arabs are the Druze, who commonly consume raw liver and other raw meat products. The other ethnic groups who live in north-eastern Jordan are perhaps protected from plague because of their distaste for raw meat products in general, and for raw liver in particular. / The Libyan cases of pharyngeal plague described by Christie *et al.* (1980) had eaten raw meat, like most of the Jordanian cases seen in 1997 (present study). Both camels and sheep can harbour *Y. pestis* infection and this infection can be passed on to humans, some times with fatal consequences, when the infected animals are slaughtered or when meat from the animals is eaten raw or inadequately cooked (Christie *et al.*, 1980). Christie *et al.* (1980) suggested that camels may play an important role in the transmission and distribution of *Y. pestis* because they often move long distances. The present report appears to be the first on an active focus of pharyngeal plague in Jordan, and only the second on pharyngeal plague in the Middle East.”]

- (179) BIN SAEED Abdulaziz A., AL-HAMDAN Nasser A. & FONTAINE Robert E.

°2005 [pdf]

*Plague from eating raw camel liver,*

in: *Emerging Infectious Diseases* 11(9): 1456-1457.

[(camels and plague; case report; raw camel liver; pharyngitis, submandibular lymphadenitis)

Abstract: We investigated a cluster of 5 plague cases; the patients included 4 with severe pharyngitis and submandibular lymphadenitis. These 4 case-patients had eaten raw camel liver. *Yersinia pestis* was isolated from ~~bone marrow of the camel~~ and from jirds (*Meriones libycus*) and fleas (*Xenopsylla cheopis*) captured at the camel corral. –

1456: (intro) “Human plague is acquired most often from the bites of infected fleas that leave their rodent hosts. Sporadic plague has also been attributed to domestic dogs and cats that may transport either *Yersinia pestis* in their mouths or infected fleas from rodent hosts to humans (1). Bubonic, pneumonic, or pharyngeal plague may develop in domestic cats and infect humans directly (2). However, humans rarely become infected when handling and preparing the carcasses of wild animals (3). Although domestic cats and other carnivores may be infected by eating infected animals, only 1 previous report raises the possibility of human plague infection from eating meat of an infected animal (4).]

## 2010

- (180) BEN NÉFISSA Kmar & MOULIN Anne Marie

°2010 [pdf]

*La peste nord-africaine et la théorie de Charles Nicolle sur les maladies infectieuses,*  
in: *Gesnerus* 67(1): 30-56.

[(plague in North Africa, theory of Charles NICOLLE; plague without rats)

Summary: Many infectious diseases were described in North Africa in 18th-19th centuries by European travellers. Most of them were allegedly imported by new migrant populations coming from sub-Saharan, European or Middle East countries. Plague outbreaks have been described since the Black Death as diseases of the Mediterranean harbours. Charles Nicolle and his collaborators at the Pasteur Institute were witnesses to the extinction of plague and typhus fever in Tunisia. Both could be considered as endemo-epidemic diseases propagated by ancient nomad communities for centuries. Typhus was exported to other countries; plague was imported by Mediterranean travellers but also hid in unknown wild-animal reservoirs. The role of the bite of a rat's flea was not confirmed and the pneumonic form might have prevailed in the medieval North African cities. Association between plague, typhus, flu and other causes of immune deficiencies could explain the high morbidity and mortality caused by plague in the past. The authors comment the local history of plague at the light of the evolutionary laws of infectious disease proposed by Charles Nicolle in 1930. Keywords: plague; typhus fever; North Africa; host pathogen relations; Evolution; Charles Nicolle. –

44ff: *La peste sans rat: hypothèses explicatives.*

(camel plague) 45 n. 49: “Le bubon du chameau, *gudda*, est connu depuis longtemps dans la péninsule arabe et il est assimilé au bubon pesteux de l'homme. La maladie du rat, phénomène pourtant relevé par Avicenne au Xe siècle et anciennement connu de certaines



communautés hindoues et chinoises, ne semble pas avoir retenu l'attention des observateurs, aussi bien en Europe qu'en Orient musulman: Aroua 1974; Moulin 1996. L'absence de visibilité des épizooties par les anciens est aussi expliquée par le fait que les rongeurs malades sont des proies faciles pour les prédateurs, dont le chat qui était le seul animal domestique familier dans les médinas.”]

- (181) IBN ḤĀTIMA, Aḥmad bin ‘Alī bin Muḥammad [Abū Ġa‘far Ibn Ḥātima al-Anṣārī, 1323-1368]; GIGANDET Suzanne (ed.)  
‘2011

*La grande peste en Espagne musulmane au XIVe siècle. Le récit d'un contemporain de la pandémie du XIVe siècle.*

(Études arabes, médiévales et modernes, PFID 266)

Damas: Presses de l'Ifpo. [116p.; e-ISBN 9782351593134.]

DOI: 10.4000/books.ifpo.1436. <<http://books.openedition.org/ifpo/1436>>

[Édition de l'œuvre de Abū Ġa‘far Ibn Ḥātima al-Anṣārī *Taḥṣīl ḡaraḍ al-qāṣid fī taḥṣīl al-maraḍ al-wāfīd* (“Réponse à la demande de qui désire étudier la maladie venue d'ailleurs”), manuscrit traduit et édité par Suzanne GIGANDET. Abū Ġa‘far Ibn Ḥātima al-Anṣārī était un savant et un médecin d'Almería qui assista au déclenchement de la Grande Peste en 1348, et y succomba d'ailleurs en 1368. Dans le présent ouvrage, il nous livre un témoignage des plus précieux sur la réaction médicale au fléau en Espagne musulmane médiévale. Abū Ġa‘far s'interroge sur les causes terrestres et astrales de la pandémie ; il développe les différents traitements ou parades pour s'en prémunir. Il fait état d'un grand nombre de débats, de questionnements, présentant parfois le processus de la contagion. De longs développements ressortissent à la théologie: Dieu étant la cause de tout, y compris de la maladie et de la guérison, quelle attitude le croyant doit-il adopter face à une épidémie? Comment interpréter les directives du prophète Muhammad dans ce domaine?

• Les manuscrits

15 Le manuscrit de référence, A, est celui de l'Escorial 1785. Le second manuscrit, B, est conservé à la Bibliotheca Regia de Berlin et porte le n° 1205; il ne présente que peu de différences avec le premier: quelques lacunes, signalées en notes, quelques ajouts, signalés entre crochets droits ou en note. La pagination de A dans la traduction est indiquée entre parenthèses, en italiques (50r); celle de B est en caractères droits soulignés, entre tirets - 2r -.

• Composition du traité

16 I- Sur la connaissance réelle de l'épidémie, A (50r-52r); B 1r-5r.

17 II- Sur les causes de l'épidémie en général et dans notre cas particulier, A (52r-59v); B 4v-13v.

18 III- Pourquoi certains sont-ils atteints et non les autres parmi leurs proches? A (59v-63v); B 13v-18v.

19 IV- Que sait-on quant à sa propagation? A (63v-65r); B 18v-20r.

20 V- Comment peut-on se prémunir et se protéger? A (65r-69v); B 20r-26v.

21 VI- Comment la soigner si elle frappe? A (69v-86r); B 26v-47v.

22 VII- Que nous enseigne le législateur sur ce sujet? A (69v-86r); B 47v-56r.

23 VIII- Quel est le sens du *ḥadīṭ* qui interdit l'entrée et la sortie du territoire de l'épidémie? A (92v-95r); B 56r-60r.

24 IX- Que signifie la parole du Prophète « ni propagation ni mauvais présage »? A (95r-99v); B 60r-66v.

25 X- Comment concilier ces deux *ḥadīṭ*-s? A (99v-107r); B 66v-74r.

• Table des matières:

Introduction: Abū Ġa‘far b. Ḥātima al-Anṣārī, médecin d'Almería, face à la Peste noire du XIVe siècle

L'irruption de la peste en Europe méridionale

Ibn Ḥātima et son traité

La position d'Ibn Ḥātima face à l'épidémie

Les manuscrits

Composition du traité

Présentation de la traduction

Prologue

Première question: la connaissance réelle de la peste

I- La définition générale se présente sous deux aspects

A - Le discours lexicographique

B - Le discours médical

II- Les particularités de la maladie survenue chez nous et dans d'autres régions

Deuxième question: les causes générales et particulières de l'épidémie

I- la première sur la cause générale comprend deux sections

A - La cause proche

B - La cause lointaine

Complément

II- La cause particulière à l'épidémie actuelle

Troisième question: pourquoi certains sont-ils atteints et non les autres parmi leurs proches?

I- Réponses sur le premier aspect

A / B / C / D

II- Réponse sur le deuxième aspect

Quatrième question: que sait-on quant à sa propagation?

Cinquième question: comment peut-on se prémunir et se protéger?

Sixième question: quels traitements doit-on appliquer lorsque l'épidémie sévit?

Première partie: (70r) le traitement de la maladie dès son apparition avant qu'elle ne se soit installée et aggravée

Deuxième partie: Les traitements lorsque la maladie triomphe et s'installe

Septième question: ce qui nous vient du législateur (Muḥammad) au sujet de la peste

Huitième question: quel sens attribuer au *ḥadīth* interdisant d'entrer dans le pays où sévit la peste ou d'en sortir?

Explication des termes rares employés dans ces deux *ḥadīth*-s

Le sens des deux *ḥadīth*-s et leurs enseignements

Neuvième question: quel est le sens des paroles (de Muḥammad): Pas de contagion, pas de superstition

Explication des termes rares dans ces *ḥadīth*-s

Signification des *ḥadīth*-s

Ce que nous approuvons et retenons de tout cela

Dixième question: comment concilier les deux *ḥadīth*-s.

• (Camel plague, ganglions) 77-87: *Septième question: ce qui nous vient du législateur (Muḥammad) au sujet de la peste* 1

“8 Le *qādī* Abū al-Faḍl b. ‘Iyāḍ dit: « La première manifestation de la peste est une éruption d'ulcères sur le corps; l'épidémie est l'extension de la maladie, mais on l'appelle “peste” en raison de la similitude de la mort. Toute peste est une épidémie, mais toute épidémie n'est pas la peste. »

9 Selon la tradition de ‘Ā’īša, -49r- elle questionna le Prophète sur la peste et il répondit: « Ce sont des ganglions comme ceux du chameau <sup>3</sup> qui apparaissent aux hypocondres (ou parties molles de l'abdomen) <sup>4</sup> et aux aisselles. » Le *qādī* Abū ‘Amr Yūsūf b. ‘Abd al-Barr dit que plus d'un homme de science a déclaré que les ganglions sortent aux mains et aux doigts et en quelque endroit du corps que Dieu a fixé.

n. 3 Cette définition renvoie à un *ḥadīth* authentique: « Le possesseur d'animaux malades ne les fera pas paître auprès d'un troupeau sain » (M.A. al-Khattābī, *al-Ṭibb wa-l-aṭibbā’ fī l-Andalus al-islāmīyya*, 2, *Dar al-ḡarb al-islāmī*, Beyrouth, 1988, p. 154).

n. 4 Le terme arabe *marāqq* est formé sur la racine *raqqa*, être mince, fin; on trouvera plus loin une explication grammaticale de ce mot. Les hypocondres sont les flancs, situés entre les fausses côtes et l'os iliaque (*Nouveau Larousse illustré*, Paris, Larousse, p. 209). Dans le paragraphe suivant, ils sont désignés comme “la racine des cuisses” qui serait plutôt la région des aines, *al-‘urbīyya*. [German: ‘weichen, weichteile’]

10 Ce qu'a dit le Prophète est exact, mais c'est seulement le cas le plus fréquent – Dieu est le plus savant!

11 L'auteur - Dieu ait pitié de lui! dit que cette forme de la maladie dont parle le Prophète présente des ganglions analogues à ceux du chameau, c'est la peste bubonique qui apparaît aux plis du corps et, comme le dit l'Envoyé, aux hypocondres, aux aisselles et dans les zones voisines, plus rarement derrière et autour des oreilles. Ainsi le propos du Prophète ne concerne-t-il que les cas fréquents. [ganglion(s): geschwulst, lymphknotenschwellung]

12 Quant à la forme qui affecte les mains et les doigts je ne l'ai pas encore observée durant l'épidémie actuelle et la science nie son existence, mais reconnaît que sur les mains et les doigts apparaissent des ulcères noirs; cependant c'est une forme rare et ils se trouvent surtout sur le dos et le cou comme le prouve l'expérience. Loué soit Celui qui a doté Son prophète d'une langue véridique réservée à lui seul! -49v- Il ne s'exprime que par elle et n'enseigne qu'à la (87v) lumière divine! Dieu Très-Haut a purifié sa noble terre et sa tombe, ce haut lieu que Dieu a embaumé et où Il a prodigué les parfums, de sorte que, comme on le sait, jamais la peste ne l'a touchée et elle est restée indemne. Sur lui la prière et le salut! Il est le juste, l'authentique, le meilleur en son temps, sur lui le salut! (...)

14 L'hypocondre, *al-marāqq*, est la région de l'abdomen mince et souple; ce terme désigne les racines des cuisses, c'est un pluriel construit sur le schème *mafā‘il* des verbes sourds avec l'assimilation des deux dernières radicales, *‘ayn* et *lām*, du verbe sourd *raqqa*; le terme *marāqq* n'a pas de singulier.”]

(182) LESLIE T., WHITEHOUSE C.A., YINGST S., BALDWIN C., KAKAR F., MOFLEH J., HAMI A.S., MUSTAFA L., OMAR F., AYAZI E., ROSSI C., NOORMAL B., ZIAR N. & KAKAR R.

°2011 [pdf]

*Outbreak of gastroenteritis caused by Yersinia pestis in Afghanistan,*

in: *Epidemiology and Infection* 139(5): 728-735, 1 fig., 3 tables.

<http://doi.org/10.1017/S0950268810001792>

<http://www.jstor.org/stable/27975649>

[(plague in Afghanistan, Dec 2007; camel plague causing gastroenteritis)]

Summary: Plague, which is most often caused by the bite of *Yersinia pestis*-infected fleas, is a rapidly progressing, serious disease that can be fatal without prompt antibiotic treatment. In late December 2007, an outbreak of acute gastroenteritis occurred in Nimroz Province of southern Afghanistan. Of the 83 probable cases of illness, 17 died (case fatality 20.5%). Being a case was associated with consumption or handling of camel meat (adjusted odds ratio 4.4, 95 % confidence interval 2.2-8.8,  $p < 0.001$ ). Molecular testing of patient clinical samples and of tissue from the camel using PCR/electrospray ionization-mass spectrometry revealed DNA signatures consistent with *Yersinia pestis*. Confirmatory testing using real-time PCR and immunological seroconversion of one of the patients confirmed that the outbreak was caused by plague, with a rare gastrointestinal presentation. The study highlights the challenges of identifying infectious agents in low-resource settings; it is the first reported occurrence of plague in Afghanistan. Key words: Emerging infections, infectious disease epidemiology, laboratory tests, plague, zoonoses.

729: "Reports of an outbreak of acute gastroenteritis which included deaths were received by DEWS from the provincial hospital in the southwestern Afghan province of Nimroz in December 2007. The symptoms reported were fever and severe gastroenteritis with rapid onset, in some cases including lymphadenopathy and more rarely, pharyngeal lesions. As reported by hospitalized victims, and confirmed by the community, just prior to the recognition of cases a camel that was clinically ill was slaughtered and distributed among many residents of one village and to some residents of two neighbouring villages. The animal was reported to be visibly ill, in retrospect with an infectious disease, exposing up to 2000 people potentially. Because of this and the severity of symptoms, an outbreak investigation was undertaken. The spectrum of clinical features, and the potential involvement of camel meat, led to an initial hypothesis that *Bacillus anthracis* was the responsible pathogen. Human cases of gastrointestinal anthrax associated with infected livestock have been widely reported in the past [10]."

733: "Once infected, the camel had become clinically ill but was slaughtered and the meat distributed widely. Cooking practices may explain differential exposure and thorough cooking almost certainly would have limited the outbreak. A speciality of rare-cooked camel is evident in this region, and while some may have prepared the food in this way, most of it would have been cooked thoroughly. Those who were closely associated with the slaughter and handling of the camel meat, including cooking, had elevated risk of disease and death. The attack rate in patients who had cooked the meat was ~80%."

(183) MAHONEY Casey W., TOPPIN James W. & ZILINSKAS Raymond A. (eds.)

©2013 [pdf]

*Stories of the Soviet Anti-Plague System.*

(CNS Occasional Paper No. 18)

Pierce St., Monterey, CA: James Martin Center for Nonproliferation Studies; Monterey Institute of International Studies.

[xi+277p.; ills.; ISBN 978-0-9892361-3-3.]

<http://www.nonproliferation.org/stories-soviet-anti-plague-system/>

[(Soviet anti-plague system, 20th c.)]

Blurb: Throughout the 20th century, the USSR Ministry of Health's 2nd Directorate headed an "anti-plague (AP) system" whose main objective was to protect the country from endemic and imported dread diseases such as plague, anthrax, and others. In addition, it had an important, two-phased role in the Soviet Union's biological warfare (BW) program—to provide training to the BW program's scientific workers on biosafety practices and to submit cultures of especially virulent pathogens to that program's research and development institutions. Because the USSR considered information about endemic infectious disease, as well as BW-related activity, to be state secrets, hardly any outsiders knew about the AP system's work and scientific accomplishments. To this day, the five Russian AP institutes remain closed to outsiders and are almost as secretive about their current activities as they were during the Soviet era. –

(camel plague) 8: Unfortunately, they do not translate a table on the topic of "Records from the former USSR detail 38 plague outbreaks among camels within the period 1907-1967."

216: "(quote) "I was given infected camels as patients. One time, we were successful in isolating the plague bacterium. We had trudged along for hours in deep sand to where the camel had fallen. By that time, the animal's putrefied body had bloated and looked like a sphere. When we opened the body to start the autopsy, we were literally bathed from head to toe in a horrid-smelling liquid that came from the camel's belly. My entire AP suit was soaked and I almost fainted. Somehow, we were able to extract the internal organs to perform a biopsy. After that, we spent quite some time bathing and disinfecting ourselves. The risk of contrac-

ting plague was huge. Those events took place in 1949, but the plague remains just as ugly today as it was back then.” / ”]

- (184) FAYZEEVA D.B. Файзеева Д.Б., ANDREEVA A.V. Андреева А.В.  
°2016 [pdf] *Laboratornaya diagnostika i spetsificheskaya profilaktika zoonotropnoy chумы*  
Лабораторная диагностика и специфическая профилактика зооантропонозной чумы – *Laboratory diagnostics and specific prevention of pestis camelorum*.  
<<https://www.scienceforum.ru/2016/pdf/25092.pdf>> [3p.]  
[(camel plague) brief overview.]
- (185) MALEK Maliya Alia, BITAM Idir & DRANCOURT Michel  
°2016 [pdf, mp4] *Plague in Arab Maghreb, 1940-2015: A Review*,  
in: *Frontiers in Public Health*, 03 June 2016, 4: 112.  
[6p., 38 refs.; supplementary data: video1.mp4]  
<<https://doi.org/10.3389/fpubh.2016.00112>>  
<<https://www.frontiersin.org/articles/10.3389/fpubh.2016.00112/full>>  
[(review article; plague in Arab Maghreb, 1940-2015; oral route of contamination by meat consumption; camel plague; video map with locations of plague incidents through reviewed time period)  
Abstract: We reviewed the epidemiology of 49 plague outbreaks that resulted in about 7,612 cases in 30 localities in the Arabic Maghreb (Mauritania, Morocco, Algeria, Tunisia, Libya, and Egypt) over 75 years. Between 1940 and 1950, most cases recorded in Morocco (75%) and Egypt (20%), resulted from plague imported to Mediterranean harbors and transmitted by rat ectoparasites. By contrast, the re-emergence of plague in the southern part of Western Sahara in 1953 and in northeast Libya in 1976 was traced to direct contact between nomadic populations and infected goats and camels in natural foci, including the consumption of contaminated meat, illustrating this neglected oral route of contamination. Further familial outbreaks were traced to human ectoparasite transmission. Efforts to identify the factors contributing to natural foci may guide where to focus the surveillance of sentinel animals in order to eradicate human plague, if not *Yersinia pestis* from the Arab Maghreb. Keywords: *Yersinia pestis*, plague, outbreak, foci, Maghreb Arab. –  
4: “Semi-domestic and domestic animals are another source of plague. Buboes are seen in domestic mammals, such as cats, dogs, and camels (23) [RUST *et al.* 1971]. In camels, the principal companion of nomad tribes, buboes have long been known as “gudda” in the Arabian Peninsula and have been linked to human plague bubo by nomads. Camel plague has been described by Sotnikov in 1974 in Africa, Eurasia (USSR), Asia (Mongolia, China, India), and the Middle East (Iran, Iraq) (24) [(175) MCGRANE & HIGGINS 1985]. Camels may present the three forms of plague and die within 20 days after an incubation period of 1-6 days. Not only camels but also gazelles, goats, sheep, and hares die inexplicably and although not forming part of the cycle of plague were described as being responsible for contamination (3, 25) [(140) POLLITZER 1954: 305; (149) FEDOROV 1960a]. Four patients with adenitis were in close contacts with cattle, including five sheep with superficial adenitis in the Al Mounek camp (9) [(169) ALONSO 1971]. In 1976, in Libya four patients contracted plague 4 days after slaughtering and skinning a camel. The camel was eaten by some villagers after having been in contact with it, including one who resold the meat. Seven adults exhibiting a serologically confirmed bubonic plague were also reported and the reseller’s daughter presented with groin bubo. Villagers testify that the slaughter took place following an illness contracted by the camel that presented a swollen neck gland but no study states whether it was confirmed as plague positive or not. In Krom-el-Kheil, the outbreak started by a father who killed and skinned a sick goat 2 days before his admission to hospital. The goat skin was kept and treated by the woman at home, where recent and older dead rats were found. It was, therefore, supposed that rat flea were responsible for the goat infection. In Al-Azzizat, a 12-year-old boy, who had also skinned a sick goat, contracted the disease and recovered with anti-biotherapy. Four goats from the herd were tested and one of them was revealed as being seropositive to *Y. pestis*. In January 1977, an outbreak in Jadu in southwest of Tripolitania, involved 11 cases following the slaughter of a dying sheep, confirmed by *Y. pestis* isolation. In April–May 1967, an epizooty of rodents and gazelles and one child died of adenitis in Aguedat Iguenine was reported in a permanent nomad camp in Mauritania (9). Four months before the first outbreak, fleas in tents and the absence of dead rodents were observed with deaths in camels, cattle, sheep, goats, and even donkeys. Human cases suffering from bubonic plague may have resulted from contacts with sick camels that had been killed. Camel buboes cultured *Y. pestis*, Orientalis biotype but plague remained undeclared to the WHO (9). In 32 patients, plague could be traced to direct animal contacts with goats, sheep, and camels. In particular, eating

camel meat recovered from a sick animal was documented in Mauritania and Libya for the second period. In addition, the epizooty in camels had resulted in human cases by affecting nomadic tribes. There is one confirmation of a published report of oral contamination. Christie et al. (10) proposed an oral transmission route of in the 1976 Libyan outbreak. Goat and sheep are also considered to be sentinel animals, indicating plague in a given focus (3). The 1977 outbreak in Libya confirmed the high risk of direct contact with carcasses from livestock infected with plague. In addition to their migrant lifestyle leading to close contacts with rodents and thereby promoting the spread of the epidemic to other regions, some nomads' tribes consumed dried rodent meat and traded in rodent furs (26) [AUDOIN-RUZEAU 2003]. The majority of plague foci in the Maghreb are located in sub-desert nomadic regions. To the east there is the Libyan focus and to the west there is the northeast focus of Mauritania. In low-lying areas, where the habitat is particularly favorable both to the survival of the plague bacillus by the presence of sensitive rodent species and the availability of watering points in demand by migrants for stopovers and the presence of plants that camels fed upon (21) [(170) KLEIN et al. 1975].”

4-5 (discussion): “Moreover, plague epidemiology changed from mixed rural and urban epidemics to rural epidemics involving nomads who currently remain the sole populations to be affected by deadly plague. Nomads mainly acquired plague through close contacts with domestic goats and camels. In particular, the consumption of poorly cooked meat from slaughtered sick animals is a source of plague for these populations; illustrating that deadly plague could be transmitted orally, as also described in Saudi Arabia in the form of severe pharyngitis in 1994 (31) [(179) BIN SAEED et al. 2005] and in Jordan in 1997 (32) [(178) ARBAJI et al. 2005]. Although this route of contamination has been neglected, animal models show that *Y. pestis* could cause deadly septicemia after intragastric inoculation, without stool excretion (33) [BUTLER et al. 1982]. This situation is not surprising considering that *Y. pestis* was shown to have evolved from *Yersinia pseudotuberculosis*, a pathogen responsible for digestive tract infection, after chromosome reduction and acquisition of three plasmids (34). Accordingly, *Y. pestis* retained the *Yersinia* genus capability to enter the digestive tract, further acquiring the capability to cross the digestive tract barrier to provoke deadly septicemia. These observations should be taken into consideration for further risk assessments of human plague. / The fact that plague re-emerged in the very same location after decades of absence (11, 12, 14), and was genetically documented as being local one (19) along with continuous documentation of zoonotic plague illustrate the presence of plague foci in the Arab Maghreb. Evidence that *Y. pestis* persists in the soil under natural (35) and experimental (36) conditions suggests that plague foci are telluric, where burrowing mammals could be infected by contacts with infected soil. Accordingly, nomads used to avoid the regions where plague cases had occurred, described as “curse areas.” Respect for this rule even led people to believe that plague had been eradicated.”]

- (186) RIVKUS Yuriy Zalmanovich РИВКУС Юрий Залманович  
& BLYUMMER Aleksandr Gennadiyevich БЛЮММЕР Александр Геннадиевич  
©2016 [pdf] *Endemiya chumy v pustynyakh Sredney Azii i Kazakhstana*

Эндемия чумы в пустынях Средней Азии и Казахстана.

[Endemic plague in the deserts of Central Asia and Kazakhstan]

Voronezh Воронеж, Russia.

[pdf: 357p.; 25 tables, 21 figs.; bibliography: 350 titles. 291-305 (15p.): Abstract in English “The plague endemy structure analysis” [sic]. For specialists in especially dangerous infections, medical geography, ecology, medical history.]

<[http://rivkus.ru/wp-content/uploads/2017/03/Эндемия-чумы-в-пустынях-Средней-Азии-и-Казахстана\\_tab.pdf](http://rivkus.ru/wp-content/uploads/2017/03/Эндемия-чумы-в-пустынях-Средней-Азии-и-Казахстана_tab.pdf)>

[(endemic plague in Central Asia and Kazakhstan, 1904-1999)

223-227: (machine tr.) “8.2. Probability of infection from plague camel /

From the set of primary-mediated epidemiological foci of the commercial-consumer type plague, we consider the most important variant in the epidemiologic sense: the version of the “camel” plague [(137) Nikanorov, 1922; [(127)(128)] Klodnitsky, 1911; 1912; [(177)] Rivkus, Hotko, 1994a).

The probability of infection of a person from a plague camel ( $R_s$ ) was determined by the product of two probabilities: infection of the animal in the epizootic territory ( $R_3$ ) and its prerecording during the period of the disease ( $R_4$ ). In assessing the first probability, it should be noted that the methods of plague camel infection in natural conditions are far from being studied. As is known, in the experiments of A.A. Flegontova et al. (1960) of 11 camels, for each of which dozens of blocked fleas were produced, eight animals became ill with the plague. The minimum number of fleas *Coptopsylla lamellifer* with a block of pancreas, which was required for infection of the animal, was 76.

More often it required 120-260 blocked individuals. In nature, the simultaneous attack on a single camel of so many blocked *C. lamellifer* is hardly possible. In such experiments (Sivolobov



*et al.*, 1960), four camels became infected as a result of feeding on eight camels of hundreds of *Ornithodoros tartakovskyi* ticks infected with the plague pathogen (200-882 individuals). If we still admit that the fleas of the genus *Coptopsylla* are a fairly effective factor in the infection of camels, one would expect the greatest incidence of their diseases in the autumn months to which the *Coptopsylla* generation is associated. Meanwhile, judging by the research of S.Kh. Khamzin and V.S. Ivanov (1981)[(173)], from 88 plague camels, identified in 1907-1973. On the territory of the Central Asian desert and adjacent to it other natural foci of the plague, 57.9% occurred in April-September, when *Coptopsylla* populations are in a state of diapause. Active during this period, the fleas of *Xenopsylla* are unlikely to regularly infect camels, because are adapted to the tender skin of small animals. The role of ticks also remains questionable [(143)(146)] Lobanov, 1963, 1969; [(164)] Lobanov *et al.*, 1969; Aikimbayev *et al.*, 1987). Very little study of the mechanism of infection of plague camels in natural conditions does not allow to model this phenomenon according to the above principle. Therefore, in order to quantify it, we used, as empirical indicators, the data available in the literature.

V.N. Lobanov (1963) [(143)] notes that not every infection of camels through ectoparasite bites led to the disease, and the diseased animals in all cases recovered. Clinical manifestations of them in the form of fever and painful buboes were noted in a day and up to 26-30 days. Cultures of the pathogen in killed animals could be isolated mainly from regional lymph nodes - in 76.9%, from distant lymph nodes and internal organs - in 17.3% of individuals.

In septic plague, caused only by intravenous injection of a plague microbe, fever, depression, weakness were expressed. By the fourth or fifth day, these symptoms increased, and on the seventh day animals, in most cases, died. Virtually all internal organs and blood were infested with agitator. However, plague sepsis, according to V.N. Lobanov, with natural infection from ectoparasites, can develop only in single camels.

In natural conditions, according to P.I. Shamanek *et al.* (1974), among the 335 who died in 1965-1972. In the Guryev region of camels, a bacteriological diagnosis of plague was established in 12 individuals (3.6%). According to our observations, of the 896 corpses of camels investigated in the Kyzyl Kum in the years 1948-1990, only eight of them (0.9%) were isolated from the culture of the pathogen.

Based on the materials of S.Kh. Khamzin and V.S. Ivanov (1981) laboratory plague was diagnosed in 0.1% of camels from the livestock that grazed on the site with an intensive plague epizooty. Judging by the presence of specific antibodies in the blood, the number of camels that are infected on an epizootic site, according to V.M. Stepanov *et al.* (1967) [(158)], can reach 0.75. Here, obviously, do not include individuals who have been acutely affected by the plague and died from it.

These results are close to the results of a serological study of blood serums of camels from epizootic territories, obtained by P.I. Shamanek *et al.* (1974): specific antibodies were detected in 1.2% of the individuals.

In connection with the above, it is permissible to assume that about 1% of these animals can be infected from the number of camels grazing in the area where intensive plague epizootics occur. Approximately half of them (0.5% of the total number of livestock) will develop a bubonic plague, ending within a month by self-recovery of the animal, and 0.01% may experience generalized plague that will lead to death within a week. The likelihood of the disease of camels by both forms of plague (P3) will not exceed 0.0051.

The analysis of plague camel plague in the seasonal aspect was carried out: 9.4% of cases are in December-February (XII-II), 10.5% in March-May (III-V), 45.8% in June-August VI-VIII), 34.2% - for September-November (IX-XI). Most camelids (95.5%) are infected with camels of the individual sector (Khamzin, Ivanov, 1981).

According to these data, the probability of disease of animals plague during the year was determined: P3 (XII-II) = 0.0005; P3 (III-V) = 0.0005; P3 (VI-VIII) = 0.0023; P3 (IX-XI) = 0.0017.

The figures for camels in private possession will be:

P<sup>3</sup> (XII-II) = 0.00048; P<sup>3</sup> (II-V) = 0.00048; P<sup>3</sup> (VI-VIII) = 0.0021; P<sup>3</sup> (IX-XI) = 0.0015, but for animals in the public sector:

P<sup>3</sup> (XII-II) = 0.00002; P<sup>3</sup> (III-V) = 0.00002; P<sup>3</sup> (VI-VIII) = 0.0002; P<sup>3</sup> (IX-XI) = 0.0002.

Such a small belief in the disease of camel plague and probably explains the rarity of their detection spontaneously infected under natural conditions. If we take into account that the plague is mainly caused by camels of private owners, then, in the natural focal area, within 100 thousand head, on the sites of intensive epizootics occupying about 1.5-2.0% in any of the years, territory, there can be up to 2 thousand camels.

This makes possible the simultaneous disease of several animals. For example, in the Ural-Emba interfluvium in 1968, five plague camels were identified, in 1970 three; in Mangyshlak in 1948 and in Ustyurt in 1968, three camels were found infected with plague (Khamzin, Ivanov, 1981).

Only once the mass plague of plague was recorded: in 1953, in Western Turkmenistan, 15 plague camels were identified against an intensive diffuse epizootics that covered about 4 million hectares (Akiev *et al.*, 1970).

The question of the probability of pruning a plague camel is more difficult (P4). According to the information at our disposal, in the presence of more than 200 thousand camels in the Central Asian deserts, from 1948 to 1990, only 78 of them were found plague, although in the course of 42 years thousands of corpses of these animals were investigated by anti-plague workers. During this period, in 20 cases, people who participated in the slaughter of camels were infected. It can be assumed that about every fourth plague camel was hammered.

The frequency of forced slaughter of camels depends, first of all, on the peculiarities of life and traditions of the local population, but in general its probability, P4, does not exceed 0.25. This indicator is typical for the 40-50-ies, when outbreaks associated with camels, relatively regularly recorded in most regions of the natural focality of the plague, excluding Muyunkumo-Pribalkhash. In the last decades of the 20th century, due to the increase in the sanitary literacy of the population, the danger of slaughtering a patient with the plague of a camel has significantly decreased: the epidemic centers caused by this factor only appeared twice: in 1990 in Aralsk and in 1999 in the village of Zhana Sharva). However, as will be shown in the next chapter, due to many circumstances, the problem of the “camel” plague can again become very actual throughout the CIS space.

On the basis of the given empirical data, we determined the probability of human infection from a camel (RS) equal to 0.0012. In the seasonal aspect:

PC (XII-II) = 0.0001; PC (III-V) = 0.0001; PC (VI-VIII) = 0.0006; PC (IX-XI) = 0.0004.

Thus, the probability of an epidemic outbreak associated with pruning a plague camel is 10 times less than that caused by a bite of wild rodent fleas. The lowest values are in winter and spring, much larger in summer and in autumn.”]

(187) ZIEGLER Michelle

\*°2017c [pdf]

*Ancient Plague Strains in Kyrgyzstan.*

December 18, 2017, Contagions blog.

[<https://contagions.wordpress.com/2017/12/18/ancient-plague-strains-in-kyrgyzstan/>](https://contagions.wordpress.com/2017/12/18/ancient-plague-strains-in-kyrgyzstan/)

[(56 plague strains collected by the Russian Anti-Plague Institute ‘Microbe’ in Kyrgyzstan during 20th c.; scenario for plague of Justinian) Comment on EROSHENKO *et al.* 2017.

Includes *Yersinia pestis* halotolerance, and camel plague: “The Bactrian camel is adapted to drink salty or brackish water and eat salt-tolerant plants. This should have made Lake Issyk-Kul a major point to refresh these camels, named for the Bactrian region that included Lake Issyk-Kul. These camels were the primary pack animal for the entire Silk Road and once ranged from the Gobi desert in China to the eastern Caspian Sea. (...) So we have an environment that creates ideal mountain enclaves, some with salty soil that is permissive to the endurance of old strains of plague (as seen in arid North Africa), and a pack animal that is susceptible to plague concentrated in a region that is an important branching point in the Silk Road. We also know that humans readily contract the plague by consuming infected camels ([178] Arbaji *et al.*, 2005; [182] Leslie *et al.*, 2011). The largest recent outbreak occurred in arid southwest Afghanistan.”]

## Historical veterinary medicine • ethnoveterinary medicine

### (134) KOWALEWSKI J.-M. [KOWALEWSKY, KOVALEVSKY КОВАЛЕВСКИЙ]

[Membre correspondant de la Société de médecine vétérinaire pratique à Paris]

°1912

*Le Chameau et ses maladies d'après les observations d'Auteurs Russes.*

in: Journal de Médecine Vétérinaire et de Zootechnie, Lyon,

Cinquième Série, Tome XV: 462-466 (Août), 540-549 (Septembre),

600-613 (Octobre). <<http://gallica.bnf.fr/ark:/12148/bpt6k9757631p/>> [pdf]

[(camel plague; Kirghiz/Kyrgyz camel disease names)]

Contenu: 1° Les races de chameaux [en Russie]; 2° Leurs maladies, d'après WIEDORNIKOW PETROWSKY; 3° L'étude préliminaire de la maladie analogue à la *Peste bubonique de l'homme* chez les caméliens, d'après le mémoire du D<sup>r</sup> KIODUITZKY [sic], d'Astrakan.

[Note: KIODUITZKY, below written KLODUIZKY, should probably mean (127)(128) KLODNITSKY КЛОДНИЦКИЙ (?), implying two typos.] –

1°, 462: “L'élevage des caméliens est surtout pratiqué dans le Sud-Ouest, dans les Gouvernements d'Uralk, de Samara, d'Orenbourg, d'Astrakan, de Saratow, dans la Transcaucasie, le Turkestan russe et en Sibérie.”

462-464: 5 races:

- a) Le chameau noir à deux bosses nommé *Torriapakk* par les Kirguizes.
- b) Chameau blanc (*ak-tué*).
- c) Le chameau à deux bosses (*Ayguer True*).
- d) Chameau simple à une hosse Dromadaire (*Narr*).
- e) Le Dromadaire de Hiwa (*Loqqé*).

2°, 464ff.: Peste bovine (rinderpest, viruserkrankung).

540: Le charbon (anthrax, *Djam datou*).

541-543: La fièvre aphteuse (*Aoussonne* ou *Sarpéi*).

543-544: Péripneumonie contagieuse (*Kara-ounke*).

544-546: Entérite infectieuse (*Tschak*).

546: Variole (*Yetschyk* ou *Aktantschyx*).

547-549: Morve du chameau (*Malleus Camelis*).

600: La rage (*Djynkakkane*).

600-601: Tuberculose (*Kuksay*).

602-603: Tuméfaction de la bouche (*Fetsche*).

603-604: Strongylose.

604-605: Distomatose (*Djournoun-Kaunte*).

605: La gale (*Koutour-Akapse*).

606-607: *Kara-Kourte*. [*kara kurt bie*] — Maladie déterminée, d'après KOWALESKY [sic], par une araignée venimeuse qui porte le nom de « Kara-Kourte », parmi les indigènes des steppes kirguizes du Turkestan, ce mot signifiait « ver noir ». Cette espèce est plus petite que la Tarentule, de couleur noire et velue; elle sécrète un liquide d'une odeur désagréable. Elle tisse sa toile sur l'herbe et se nourrit d'insectes, particulièrement de sauterelles. Leur nombre augmente corrélativement avec celui des sauterelles. (...)

[Note: • PALLAS Peter Simon 1771, *Reise durch verschiedene Provinzen des Russischen Reichs*, Th. I, p. 385 (?), 476 Anh. n. 80. Phalangium Calmucc. *Bychorcho*; PALLAS 1776: Th. III, p. 650 Ejud. Spicil. Zool. Fasc. III, F. 7-9 *Die langhaarige, höchstgiftige, milbenförmige Skorpionspinne*. Desselben Neue nordische Beyträge, Th. II. p. 345. (apud JÖRDENS)]

PALLAS 1771: 476 “80. PHALANGIVM Miscell. Zool. *inedita*. / Calmucc *Bychorcho*. / *Mole* saepius subaequat Tarantulam, qua longior. *Abdomen* molle, anulatum, oblongum. *Thorax* vrceolatus, gibbus, antice truncatus, tuberculoque ad medium marginem prominentissimo, ocellisero notatus. *Chelae* oris sessiles, venenistuae, magnae, ventricosae, situ verticales, digito inferiore mobili. *Brachiae* praetentantia, pedibus maiora, cumque pedibus primi paris mutica, apice obtuso terminata. *Pedes* octo; sex postici vnguiculati; postica femora sub appendiculis circiter quinis, triangulis, planis, petiolatis. *Artus* omnes pubescentes, pilisque rarioribus praelongis adpersi. *Color* gryseus, chelarum digiti dentati testacei. *Colit* arundineta desertorum australium, omnium concensu venenatissimum Insectum.”

• JÖRDENS Johann Heinrich 1801: *Entomologie und Helminthologie des menschlichen Körpers, oder, Beschreibung und Abbildung der Bewohner und Feinde desselben unter den Insekten und Würmern*. Hof: bei Gottfried Adolph Grau; Band 1, pp. 208-215 *Die spinnenartige Solpuge*, Tab. VIII, fig. 6-10.

<[https://books.google.ch/books?id=dK3PAQAACAAJ&hl=de&source=gbs\\_navlinks\\_s](https://books.google.ch/books?id=dK3PAQAACAAJ&hl=de&source=gbs_navlinks_s)>

• *Brehms Thierleben. Allgemeine Kunde des Thierreichs*, Neunter Band, Vierte Abtheilung: Wirbellose Thiere, Erster Band: Die Insekten, Tausendfüßler und Spinnen. Leipzig: Verlag des Bibliographischen Instituts, 1884, pp. 631-632, 1 fig., Gemeine Walzenspinne (*Solpuga araneoides*) <<http://www.zeno.org/nid/20007974965>> “[...] [631] PALLAS erzählt wunderliche Dinge von unserer Walzenspinne, welche in den südrussischen Steppen, im Lande der Kalmücken,

*Bü-Chorgoi* (Zauberwurm) oder *Mandschi-Bü-Chorgoi* (gemeiner Zauberwurm) und der Kirgisen *Kara-Kurt-Bie* genannt, nicht minder gefürchtet wird, als anderwärts die Skorpione. Man verläßt die Gegend, in welcher sich öfters das für Menschen und deren Herden gefährliche Thier gezeigt hat. Wenn sich die Kamele und Schafe, welche im Sommer dort nackte Bäume haben, zur Ruhe niederlegen, so finden sich diese Bestien ein, springen an sie und schlagen ihre jedenfalls das Gift enthaltenden Scheren dort ein. Der Bauch schwillt an und nicht selten gehen die gebissenen Thiere an der Vergiftung zu Grunde. Da sich die Walzenspinnen gern zwischen Schilf aufhalten, so kommen sie mit diesem in die daraus erbauten Hütten und mit den Menschen in nähere Berührung, als sie selbst beabsichtigen, verkriechen sich gleich den Skorpionen in die Kleider und führen überhaupt ganz deren Lebensweise. / Nach dem Aberglauben der Kalmücken muß die Milch einer Frau, welche ihr erstes Wochenbett abhält und – als Mädchen keusch lebte, oder, in Ermangelung dieses Mittels Lunge und Herz, welche einem lebendigen, *schwarzen* Thiere (Hund, Katze) aus dem Leibe gerissen worden sind, auf die Bißwunde gelegt werden, um die Vergiftung zu heilen. Von den Aerzten in Sarepta wurden zu PALLAS' Zeiten Einreibungen von Nußöl oder mit Kampfer gesättigtem Baumöle erfolgreich angewendet. Der Biß ist ungemein schmerzhaft, erzeugt starke Entzündung, vorübergehende Lähmung, Kopfweh, Ohnmacht.”]  
 607-608: Rhumatisme musculaire. — Le surnom Kirguize est « Segtschyte ».  
 608: Maladie du sabot.  
 3°, 608-619: **Peste bubonique à forme pulmonaire.** *Pestis buboniba forma pulmonaris camelli*, d'après le Dr KLODUTZKY (Astrakan). (see above)

- (188) MCCORKLE Constance M. & MATHIAS-MUNDY Evelyn  
 °1992 [pdf] *Ethnoveterinary Medicine in Africa*,  
 in: Journal of the International African Institute 62(1): 59-93.  
<http://www.jstor.org/stable/1160064>  
 [Abstract: Local knowledge systems have won growing attention and respect within conventional science and in the international development community. Such systems have usually resulted from centuries of local people's empirical observation and experience and typically are highly ecologically sensitive. The information they embody and their associated materials and techniques can be of immense practical value in mounting cost-effective, socio-culturally and politically workable, environmentally benign, and thus sustainable, initiatives to improve human livelihoods and well-being. The present article overviews one pioneering branch of research and development for the continent of Africa: ethnoveterinary medicine. Indigenous healers, ethno-aetiologies, ethnopharmacology and toxicology, vaccination and surgical skills, and selected health-related husbandry practices are described. These data are then analysed from both social scientific and biological-technical perspectives, to identify limitations and potentials in putting African veterinary expertise to work in truly appropriate agricultural development. The authors conclude with recommendations for both immediate and future directions in the study and utilisation of this corpus of valuable, but endangered, knowledge. – Camels mentioned in passing, *no camel plague.*]
- (189) FRANKE Herbert & VON DEN DRIESCH Angela  
 °1997 [pdf] *Zur traditionellen Kamelheilkunde in China.*  
 Mit einem veterinärmedizinischen Kommentar von Angela VON DEN DRIESCH.  
 in: Sudhoffs Archiv 81(1): 84-98 (99-104 Kommentar).  
<http://www.jstor.org/stable/20777618>  
 [*Fan mu zuan yan fang* 蕃牧纂驗方; *Collection of Effective Prescriptions for Equine Diseases*; German tr. “Zusammenfassung wirksamer Rezepte für erfolgreiche Viehzucht” (Yuan print), comp. WANG Yu 王愈 (*zhuan* 撰) (Northern Song), *juàn* 8, 34 recipes, damaged text.]
- (41) PETERS Joris  
 1997 *Das Dromedar: Herkunft, Domestikationsgeschichte und Krankheitsbehandlung in frühgeschichtlicher Zeit*,  
 in: Tierärztliche Praxis 25: 559-565.
- (190) PETERS Joris, VON DEN DRIESCH Angela  
 °1997 [pdf] *The two-humped camel (Camelus bactrianus): new light on its distribution, management and medical treatment in the past*,  
 in: Journal of Zoology 242(4): 651-679, 3 figs., 3 pl., 1 table.

<http://dx.doi.org/10.1111/j.1469-7998.1997.tb05819.x>

[Abstract: Eastern and north-eastern Iran and the adjacent Kopet Dagh foothills in south-western Turkmenistan have been postulated to be the region where the domestication of the two-humped camel took place. However, none of the evidence so far brought forward for in situ domestication in this area holds up to closer scrutiny. Moreover, the postpleistocene distribution of the wild camel (*Camelus ferus*) did not include Central Asia. Consequently, we claim that the region where the two-humped camel was domesticated must lie further to the east. / Among the peoples with a long-standing tradition in camel husbandry are the Chinese, as is illustrated by the antiquity of the texts on camel diseases and their treatment. In this contribution, the oldest camel treatise handed down in literature is presented and discussed.]

(191) VON DEN DRIESCH Angela

°1997 [**pdf**] *Veterinärmedizinischer Kommentar zur Kamelheilkunde im Fan-mu tsuan yen-fang.*

in: Sudhoffs Archiv 81(1): 99-104.

<http://www.jstor.org/stable/20777618>

[*Fan mu zuan yan fang* 蕃牧纂驗方; cf. (189) FRANKE & VON DEN DRIESCH 1997.]

(192) MOUSSA Ag Arya

°1998 [**pdf**] *Quels remèdes pour les principales pathologies du dromadaire chez les Touareg de la région de Tchín-Tabaraden (Niger),*

in: Pharmacopée et médecine traditionnelle africaine 10: 114-127.

(Secrétariat Général du Conseil Africain et Malgache pour l'Enseignement Supérieur (CAMES), 01 B.P. 134, Ouagadougou 01, Burkina Faso.)

[http://www.ethnovetweb.com/agarya\\_moussa.htm](http://www.ethnovetweb.com/agarya_moussa.htm) (transcript, map missing)

[(dromedary diseases; bloodletting; Tuareg, Niger; lists 21 named dromedary disease conditions in Tamacheq language, and discusses their treatments)

Abstract: To treat the diseases of their dromedaries, Touareg stockbreeders use traditional medicines that are available in their immediate surroundings. Their treatments vary from bloodletting to the use of medicinal plants and mineral products. About twenty main pathological conditions have been described for which about a hundred remedies are used. The collaboration between stockbreeders and breeding services – when the latter exist – is restricted in spite of the limited effectiveness of traditional medicines. The most-used treatment is bloodletting, either alone or combined with the application of animal products or plant medicines. Key Words: Dromedary diseases • Remedy • Traditional medicine • Blood-letting • Medicinal Plants.]

(193) SHEHADA Housni Alkhateeb

°2013 [**pdf**] *Mamluks and Animals. Veterinary Medicine in Medieval Islam.*

(Sir Henry Wellcome Asian Series 11)

Leiden: Brill.

[xx+570p.; ISBN13: 9789004234055; E-ISBN: 9789004234222.]

<http://booksandjournals.brillonline.com/content/books/9789004234222>

[blurb: Housni Alkhateeb Shehada's *Mamluks and Animals: Veterinary Medicine in Medieval Islam* is the first comprehensive study of veterinary medicine, its practitioners and its patients in the medieval Islamic world, with special emphasis on the Mamluk period (1250-1517). Based on a large variety of sources, it is a history of a scientific field that is also examined from social and cultural perspectives. Horses, as well as birds of prey used for hawking and falconry, were at the centre of the veterinary literature of that period, but the treatment and cure of other animals was not totally neglected. The Mamluk period is presented here as the time when veterinary medicine reached its pinnacle in medieval Islam and often even surpassed human medicine.]

review: • BRENTJES Sonja °2013 [**pdf**], in: *Mediterranean Historical Review* 28(2): 232-234. DOI: 10.1080/09518967.2013.837678.



## Veterinary medicine (20th c. onwards)

- (194) CROSS H.E.  
1917 *The Camel and its Diseases. Being Notes for Veterinary Surgeons and Commandants of Camel Corps.*  
London: Baillière, Tindall, and Cox.
- (195) LEESE A.S.  
1927 *A treatise on the one-humped camel in health and in disease.*  
Stamford: Haynes & Son.
- (77) ACLAND P.B.E.  
°1932 [pdf] *Notes on the Camel in the Eastern Sudan,*  
in: Sudan Notes and Records 15(1): 119-149, pl. XVI-XXIII,  
<<http://www.jstor.org/stable/41716025>>  
[136-141: (8) *Veterinary notes.* Sores and bruises; lameness; fly “trypanosomiasis”; mange; contagious necrosis of the skin (*Na'eit*); constipation; diarrhoea; colic; *Habbub*; *Khilfa*; *Ramad*; wry neck; rutting; loss of condition; firing (therapy).  
142-149: Glossary: general terms; ages; attributes; defects and diseases (u.a. “A disease? *ghudda*”); no English equivalent; paces; saddlery; watering terms; travelling; colours; parts of the body (see Pl. XVI).]
- (196) PECK E.F.  
1939 *Salt intake in relation to contagious necrosis and arthritis of one-humped camels (Camelus dromedarius) in British Somaliland,*  
in: Veterinary Record 51: 1355-1360.
- (197) CURASSON G.  
1947 *Le Chameau et ses maladies.*  
Paris.
- (198) SCHWARTZ Horst Juergen, WILSON A.J., DOLAN Rosemary, EVANS J.O., FAIRHALL J.  
°1982 [pdf] *Untersuchungen der Kamelhaltung in verschiedenen Produktionssystemen in Kenia.*  
*1. Mitteilung. Produktionsleistungen von Kamelen (Camelus dromedarius),*  
in: Der praktische Tierarzt 63(11): 964-974, 8 figs.  
<<https://www.researchgate.net/publication/259969838>>
- (199) SCHWARTZ Sabine, SCHWARTZ Horst Juergen, WILSON A.J.  
°1982 [pdf] *Untersuchungen der Kamelhaltung in verschiedenen Produktionssystemen in Kenia.*  
*3. Mitteilung. Eine fotografische Dokumentation wichtiger Kamelkrankheiten in Kenia,*  
in: Der praktische Tierarzt 63(11): 985-989, 21 photos.  
<<https://www.researchgate.net/publication/259970027>>
- (200) WILSON A.J., SCHWARTZ Horst Juergen, DOLAN Rosemary, FIELD C.R., RÖTTCHER D.  
°1982 [pdf] *Untersuchungen der Kamelhaltung in verschiedenen Produktionssystemen in Kenia.*  
*2. Mitteilung. Epidemiologische Aspekte bedeutender Kamelkrankheiten,*  
in: Der praktische Tierarzt 63(11): 974-985, 4 figs.  
<<https://www.researchgate.net/publication/259970019>>

(175) MCGRANE J.J. & HIGGINS A.J.

°1985 [pdf]

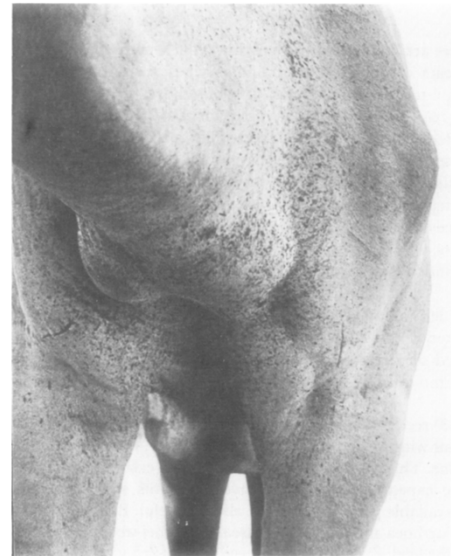
6. *Infectious Diseases of the Camel: Viruses, Bacteria and Fungi*,  
(The Camel in Health and Disease)

in: *British Veterinary Journal* 141: 529-547, 6 figs.

[(camel plague) after (167) SOTNIKOV 1973 (Engl. review 1974), and HIGGINS 1985.]

Summary: A review is given of the literature of diseases of the Old World camel (dromedary and Bactrian) caused by viral, bacterial and mycotic agents. Emphasis is placed on those diseases commonly seen in the field and where information is more readily available. An appraisal is given of the relative importance of these diseases and, where appropriate, aetiology, treatment, diagnosis, prophylaxis and control methods are suggested with comments on relative epidemiological aspects. / Camel pox is probably the most commonly diagnosed viral disease although recent serological evidence suggests a high incidence of other viral infections such as parainfluenza 3 virus. Rabies and a rabies-like disease of unknown aetiology are discussed as is the possible involvement of camels in the dissemination of important viruses such as rinderpest, foot-and-mouth disease and Rift Valley fever. Amongst the bacterial diseases, anthrax, brucellosis, salmonellosis, pasteurellosis and tetanus are not uncommon but the incidence of contagious skin necrosis appears to be declining with extensive management systems. There is some serological evidence of leptospirosis in the camel but information is sparse. Tuberculosis remains an important disease of Bactrian camels where these are intensively farmed for milk production. The only mycotic agent believed to be of importance in the camel is ringworm which is widely diagnosed in young animals.

540-541: "Camels are also susceptible to *P. pestis* infection. Sotnikov (1974) reported camel plague occurring as isolated foci in Mongolia, China, India, Iran, Iraq, Africa and the USSR. The bubonic, septicaemic and pneumonic forms are found in camels. The incubation period is one to six days and death usually occurs within 20 days. Fleas, which are the vectors incriminated in the transmission of the disease from animal to animal, must be controlled in the event of an outbreak (Higgins, 1985)."



543: Fig. 5: *Lymphadenitis of a camel in Kenya.*

(detail of (199) SCHWARTZ S., SCHWARTZ H.J. & WILSON 1982: 987, fig. 18.)

543-544: "Domenech *et al.* (1977) have described a condition in Ethiopian camels, locally called 'mala', which resembled caseous lymphadenitis in small ruminants. This is a chronic condition, developing slowly and characterized by external and internal abscess formation, usually affecting adult camels over five years of age. Lymph glands were involved, most frequently the inferior cervical, but lesions also occurred on the hindquarters and shoulder. A similar condition has been described in Kenya (Schwartz, Schwartz & Wilson, 1982) (Fig. 5). The size of the lesion varies but might reach the size of an orange or larger. Abscesses contain a non-granular yellowish pus. Didier (1975) in his study of the pathology of the camel puts considerable emphasis on the importance of corynebacteriosis in Camelidae and considers *Corynebacterium* spp. to be the main cause of 'mala'. Domenech *et al.* (1977) examined 59 cases of this condition and recovered streptococci alone, or in association with other bacteria, from 34 cases (57%). *Corynebacterium pseudotuberculosis* was isolated from 37% of cases, *Staphylococcus* spp. from 10% and *Corynebacterium progenes* from 6.7% of cases. The majority of the *Streptococcus* isolates belonged to Lancefield's group B. Local camel owners in Ethiopia contended that metastases to abdominal viscera occurred, but Domenech and his colleagues failed to confirm this. However, intravenous inoculation of a culture of *C. pseudotuberculosis* and group B streptococci produced polyarthritis and numerous muscle and subcutaneous abscesses in one camel.

They suggested that economically it was an important disease, second only to trypanosomiasis in adult camels. In certain herds, up to 10% of camels may be affected at one time.”]

- (201) FASSI-FEHRI M.M.  
\*°1987a [pdf] *Diseases of camels*,  
in: Revue scientifique et technique – Office international des  
épizooties 6(2): 337-354, 3 maps, 4 tables.  
<<https://pdfs.semanticscholar.org/1a42/5f31dfdbfa61e773e5771cbfa45357e6aa28.pdf>>  
[(diseases of camels) Note: plague is *not* mentioned.  
Summary: The first part of this paper analyses the replies received from eleven African and Asian countries to a questionnaire concerning the general conditions under which camels are bred, and their principal diseases. The replies demonstrate a growing interest in these animals and in the effect of diseases on their productivity. / Gastro-intestinal helminthoses, mange and trypanosomiasis are by far the most widespread diseases. These diseases occur in eleven countries. Their economic impact is considerable because they result in high morbidity. They can be dealt with by therapy and chemoprophylaxis. / Pox is also widespread, occurring in seven of the eleven countries, including Pakistan, Chad, Jordan and Burkina Faso. Only the USSR has a vaccine and is conducting vaccination campaigns. / Other diseases appear to be more localised and their prevalence is variable. Contagious ecthyma and paratuberculosis appear to be the main diseases in Mongolia and Kazakhstan. The spread of foot and mouth disease virus by dromedaries has been investigated in Egypt. The role of dromedaries in the epidemiology of Rift Valley fever is of interest to several countries of East Africa. / Many countries stress the need for a better knowledge of the zootechnical potential of camelidae, in order to appreciate fully the economic importance of their diseases. / The second part of this paper provides a list of diseases recorded among the Camelidae of South America. Keywords: Africa - Alpaca - Animal diseases - Asia - Bacterial diseases - Bactrian camel - Camels – Dromedary - General account - Llama - Parasitoses - South America - Viral diseases.]
- (202) \*°1987b [pdf] *Les maladies des camélidés*,  
in: Revue scientifique et technique – Office international des  
épizooties 6(2): 315-335, 3 maps, 4 tables.  
<[https://www.doc-developpement-durable.org/file/Elevages/chateau-dromadaire/Les maladies des camélidés.pdf](https://www.doc-developpement-durable.org/file/Elevages/chateau-dromadaire/Les_maladies_des_camélidés.pdf)>  
[French version of (201) FASSI-FEHRI 1987a (q.v.).]
- (176) MUSTAFA I.E.  
°1987 [pdf] *Bacterial diseases of dromedaries and Bactrian camels*,  
in: Revue scientifique et technique – Office international des  
épizooties 6(2): 391-405.  
<[http://qu.edu.iq/el/pluginfile.php/55507/mod\\_resource/content/1/Bacterial diseases.PDF](http://qu.edu.iq/el/pluginfile.php/55507/mod_resource/content/1/Bacterial_diseases.PDF)>  
[(camel plague, bacterial diseases of Camelids)  
Summary: The literature on bacterial diseases of camels is reviewed, with special reference to anthrax, brucellosis, haemorrhagic septicaemia, plague, salmonellosis, tuberculosis, paratuberculosis, leptospirosis and clostridial infections. Keywords: Bactrian camel - Bacterial diseases - Camels - Dromedary - Reviews. (119 refs.) (Sudan Agricultural Research Council, Khartoum, Sudan)  
394: on camel plague, quoting (148) STROGOV 1959; (167) SOTNIKOV 1973; (19) SAQUÉPÉE & GARCIN 1913; (151) RUTTER & MACK 1963; (156) MARTYNCHENKO 1967b; (142)(145) LOBANOV 1959, 1967; (139) KOROBKOVA 1946; (134) KOWALEWSKI 1912; (149) FEDOROV 1960a.]
- (203) DIOLI Maurizio  
°1992 *Annex 1. A Study of Tick Infestation in Four Nomadic Camel Herds in Northern Kenya*,  
in: SCHWARTZ Horst Juergen & DIOLI Maurizio (eds.) °1992 [pdf]  
*The One-Humped Camel (Camelus dromedarius) in Eastern Africa. A pictorial guide to diseases, health care and management.* Weikersheim: Margraf, pp. 263-267, 4 figs.

- (204) DIOLI Maurizio & STIMMELMAYR R.  
 °1992 *IV. Important camel diseases,*  
 in: SCHWARTZ Horst Juergen & DIOLI Maurizio (eds.) °1992 [pdf]  
*The One-Humped Camel (Camelus dromedarius) in Eastern Africa.*  
*A pictorial guide to diseases, health care and management.* Weikersheim:  
 Margraf, pp. 155-224, col. pl., tables.  
 [Contents: (...) *IV. Important camel diseases* (M. Dioli and R. Stimmelmayr)  
 Generalized conditions  
   Pox  
   Contagious ecthyma  
   Papillomatosis  
   Trypanosomiasis  
   Haemorrhagic septicemia  
 Diseases of the gastro-intestinal system  
 The respiratory diseases complex  
 Ectoparasites  
   Sarcoptic mange  
   Dermatomycosis  
   Skin necrosis  
   Ticks infestation  
   Fly infestation  
 Abscesses, wounds and lesions  
 Diseases and disorders of the nervous system  
   Rabies  
   Stiff neck (Tetanus)  
   Wry neck syndrome  
   Facial paralysis  
   Plant poisoning  
 Ocular diseases.  
 (no plague mentioned)]
- (205) STIMMELMAYR R., DIOLI Maurizio & SCHWARTZ Horst Juergen  
 °1992 *V. Field guide to post-mortem examination*  
 in: SCHWARTZ Horst Juergen & DIOLI Maurizio (eds.) °1992 [pdf]  
*The One-Humped Camel (Camelus dromedarius) in Eastern Africa.*  
*A pictorial guide to diseases, health care and management.* Weikersheim:  
 Margraf, pp. 225-276, col. pl., tables.  
 [*V. Field guide to post-mortem examination* (R. Stimmelmayr, M. Dioli and H.J. Schwartz)  
 Brief introduction to the anatomy of the camel  
 Necropsy performance  
 Necropsy examination sheet  
 Common necropsy findings.  
 (no plague mentioned)]
- (206) AL-RAWASHDEH Odeh F., AL-ANI Falah K., SHARRIF Labib A., AL-QUDAH Khaled M.,  
 AL-HAMI Yasin & FRANK Nicholas  
 °2000 [pdf] *A Survey of Camel (Camelus dromedarius) Diseases in Jordan,*  
 in: *Journal of Zoo and Wildlife Medicine* 31(3): 335-338.  
 <<http://www.jstor.org/stable/20096010>>  
 [(*Camelus dromedarius*, Jordan)  
 Abstract: Information on incidences of camel (*Camelus dromedarius*) diseases in Jordan is scarce. In this survey, 369 live and 156 slaughtered camels were examined in four Jordanian geographic regions and the proportion of diseased camels was calculated. Intestinal parasite ova were detected in 98% of camels; one or more species of external parasites were found on the skin of all camels; 33% had nasal myiasis; and hydatid cysts were identified in 44% of the slaughtered animals. Sarcoptic mange (*Sarcoptes scabiei* var. *cameli*) and trypanosomiasis, two diseases of economic importance, were also diagnosed in 83% and 33% of the 32 and 257 examined camels, respectively. Rabies virus was detected in eight camels by use of fluorescent antibody examination of brain tissues. Foreign-body accumulation within the first and second stomach compartments was the predominant gastrointestinal disease of slaughtered adult camels (22%). Ten percent of slaughtered camels had bacterial pneumonia, with *Pasteurella hemolytica* most often isolated (56% of pneumonic lungs). Further investigation into the relationship between

parasite burden and health in camels is required to assess the significance of the high prevalence of parasites. Key words: Camel, *Camelus dromedarius*, epidemiology, diseases, Jordan.]

- (207) WERNERY Ulrich, KAADEN Oskar-Rüger  
°2002<sup>2</sup> [pdf] *Infectious Diseases in Camelids*.  
2nd, revised and enlarged edition. With 179 figures and 62 tables.  
Berlin; Vienna: Blackwell Science.  
[xiii+404p.; ISBN 3-8263-3304-7; first ed. 1995.]  
<[https://books.google.ch/books?id=k\\_mh\\_mCIPXQC&hl=de&source=gbs\\_navlinks\\_s](https://books.google.ch/books?id=k_mh_mCIPXQC&hl=de&source=gbs_navlinks_s)>  
<<https://www.academia.edu/12139706/>>  
[54-55: 1.1.6 *Camel Plague*.]
- (208) ABBAS B. & OMER Osama H.  
°2005 [pdf] *Review of infectious diseases of the camel*, (review article)  
in: *Veterinary Bulletin* 75(8): 1N-16N, 254 refs.  
[Abstract: Camels were formerly considered resistant to most of the diseases commonly affecting livestock, but as more research was conducted, camels were found to be susceptible to a large number of pathogenic agents. For some diseases such as pox, mange, and enterotoxaemia, camels were indeed more susceptible and manifested more severe signs than other ruminants in the same ecozones. Pneumonia, mastitis and calf diarrhoea are the most common bacterial diseases of camels and are caused by a large number of microorganisms. Pox, contagious echthyma, papillomatosis and rabies are the only established viral diseases in camels. Although infection with several other viruses, including rinderpest, bluetongue, African horse sickness and rift valley fever has been demonstrated by serological methods, camels did not show signs of disease in spite of being in close contact with affected livestock. Camels also did not develop clinical signs of foot and mouth disease after housing for several weeks with affected animals. Increased interest in the camel as a multipurpose animal has been met with increased research into the aetiology and pathology of camel diseases; very few studies, however, have been directed towards their control. Keywords: camel: pathology: diseases: viral diseases: bacterial diseases.]
- (209) ZIDAN Kamal H., MAZLOUM K., SARAN M.A. & HATEM M.E.  
°2013 [pdf] *Abscesses in Dromedary Camels, Sheep and Goats Etiology and Pathology*.  
1st International Scientific conference of Pathology Department,  
Faculty of Veterinary Medicine, Cairo, April 25-27, 2013.  
Sheraton Dreamland Center & Conference Center.  
[Proceedings, pp. 47-59, 3 photos.]  
<<https://www.researchgate.net/publication/272090416>>  
[Abstract: Abscesses in farm animals cost the producers tremendous losses. Forty five samples were collected from dromedary camels in addition to two hundred and fifty samples collected from sheep and goats from Al-Riyadh, Kingdom of Saudi Arabia during 2012. Bacteriological examination of the samples revealed that the main causes of camel abscesses were *Corynebacterium* species (39%) and *Staphylococcus aureus aureus* (17.1%). Streptococci and *Rhodococcus* were also isolated from few cases, while no aerobic and/or anaerobic bacterial growth was seen in 29.3% of the collected samples. Four subcutaneous dermoid cysts of camel samples were collected and described during the investigation. These cysts were filled with hair and brownish watery fluid. On the other hand the main causes of abscessation in sheep and goats were *Staphylococcus aureus anaerobius* (55%), *Corynebacterium pseudotuberculosis* (24.5%) and *Staphylococcus aureus aureus* (15%). The histopathological picture of the affected camel lymph nodes (LNs) infected with *Corynebacterium* was quite different from that appeared in caseous lymphadenitis (CLA) of sheep and goats. / The current study showed that the infection of dromedary camels with abscesses is comparatively little and self limiting; unlike that in sheep and goats. Key words: dromedary camel, sheep, goat, abscess, dermoid cyst, histopathology.]



- (210) CORMAN Victor M., ECKERLE Isabella, MEMISH Ziad A., LILJANDER Anne M., DIJKMAN Ronald, JONSDOTTIR Hulda, NGEIYWA Kisi J. Z. Juma, KAMAU Esther, YOUNAN Mario, AL MASRI Malakita, ASSIRI Abdullah, GLUECKS Iona, MUSA Bakri E., MEYER Benjamin, MÜLLER Marcel A., HILALI Mosaad, BORNSTEIN Set, WERNERY Ulrich, THIEL Volker, JORES Joerg, DREXLER Jan Felix & DROSTEN Christian

°2016 [pdf]

*Link of a ubiquitous human coronavirus to dromedary camels,*

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[<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5024591/>](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5024591/)

[zoonose; coronavirus CoV; Middle East respiratory syndrome MERS)

Significance: Our results raise a scenario for the natural history of a ubiquitous respiratory coronavirus (CoV) that has established itself in humans after it was likely acquired from camels. This scenario reminds us of the pandemic potential of the Middle East respiratory syndrome CoV, an agent that is thought to be acquired from camels without presently causing sustained human-to-human transmission.

Keywords: coronavirus, evolution, ecology, zoonotic diseases, livestock.

Abstract: The four human coronaviruses (HCoVs) are globally endemic respiratory pathogens. The Middle East respiratory syndrome (MERS) coronavirus (CoV) is an emerging CoV with a known zoonotic source in dromedary camels. Little is known about the origins of endemic HCoVs. Studying these viruses' evolutionary history could provide important insight into CoV emergence. In tests of MERS-CoV-infected dromedaries, we found viruses related to an HCoV, known as HCoV-229E, in 5.6% of 1,033 animals. Human- and dromedary-derived viruses are each monophyletic, suggesting ecological isolation. One gene of dromedary viruses exists in two versions in camels, full length and deleted, whereas only the deleted version exists in humans. The deletion increased in size over a succession starting from camelid viruses via old human viruses to contemporary human viruses. Live isolates of dromedary 229E viruses were obtained and studied to assess human infection risks. The viruses used the human entry receptor aminopeptidase N and replicated in human hepatoma cells, suggesting a principal ability to cause human infections. However, inefficient replication in several mucosa-derived cell lines and airway epithelial cultures suggested lack of adaptation to the human host. Dromedary viruses were as sensitive to the human type I interferon response as HCoV-229E. Antibodies in human sera neutralized dromedary-derived viruses, suggesting population immunity against dromedary viruses. Although no current epidemic risk seems to emanate from these viruses, evolutionary inference suggests that the endemic human virus HCoV-229E may constitute a descendant of camelid-associated viruses. HCoV-229E evolution provides a scenario for MERS-CoV emergence.]

press:

• STÖCKLIN Stefan °2017: *Lästig für Tiere, tödlich für die Menschen*. Kamele und Fledermäuse sind ein Reservoir für Viren. Durch häufige Mutationen entstehen dort immer wieder für Menschen tödliche Krankheitserreger, in *Horizonte* 114: 40-41.

- (211) LIU Ye, ZHANG He-Ping, ZHANG Shou-Feng, WANG Jin-Xiang, ZHOU Hai-Ning, ZHANG Fei, WANG Yu-Mei, MA Long, LI Nan, HU Rong-Liang

°2016 [pdf]

*Rabies Outbreaks and Vaccination in Domestic Camels and Cattle in Northwest China,*

in: PLoS Neglected Tropical Diseases 10(9): e0004890.

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[Abstract: In contrast to many countries where rabies has been well controlled in humans and livestock, even in wildlife, rabies is still endemic in almost regions of China. In Northwest China, rabies transmitted by stray dogs and wild foxes has caused heavy economic losses to local herdsman, as well as causing numbers of human cases. In this study, as part of an investigation of ways to prevent rabies epidemics in livestock, we report an analysis of domestic cattle and camel rabies cases in Ningxia Hui (NHAR) and Inner Mongolia Autonomous Region (IMAR) and the immune efficacy of canine inactivated rabies vaccines in these animals. We found that rabies viruses from these animals are closely related to dog-hosted China I and fox-associated China III lineages, respectively, indicating that the infections originated from two different sources (dogs and wild foxes). As well as the previously reported Arctic and Arctic-related China IV lineage in IMAR, at least three separate phylogenetic groups of rabies virus consistently exist and spread throughout Northwest China. Since there is no licensed oral vaccine for wild foxes and no inactivated vaccine for large livestock, local canine inactivated vaccine products were used for emergency immunization of beef and milk cattle and bactrian (two-humped) camels in local farms. Compared with a single injection with one (low-efficacy) or three doses (high-cost), a single injection of a double dose of canine vaccine provided low-price and convenience for local veterinarians while inducing levels of virus neutralizing antibodies

indicative of protection against rabies for at least 1 year in the cattle and camels. However, licensed vaccines for wildlife and large domestic animals are still needed in China.

Author Summary: Rabies virus continues to cross carnivorous species and to infect humans and livestock in China. Rabies vaccination of the principal reservoir animals is even now being neglected in most regions of China, resulting in continuous expansion of rabies epidemics. Since there is no oral vaccine for stray dogs and wild animals and no inactivated vaccine for large domestic animals, rabies is not currently controlled in this country. We report rabies outbreaks caused by bites of dogs and wild foxes and the long-term effects on protection against rabies using canine inactivated vaccines in domestic camels and cattle. Our results indicate that at least three separate phylogenetic groups of rabies virus consistently exist and spread throughout Northwest China. Local canine vaccine products can be used to induce levels of virus neutralizing antibodies indicative of protection against rabies in cattle and camels; however, licensed oral and inactivated vaccines for reservoir carnivores and large domestic animals are urgently needed for elimination of rabies in China.]