



12-29-1951

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Recommended Citation

Tipton, Vernon J. and Allred, Dorald M. (1951) "New distribution records of Utah Siphonaptera with the description of a new species of *Megarthoglossus* Jordan and Rothschild 1915," *Great Basin Naturalist*: Vol. 11 : No. 3 , Article 5.

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NEW DISTRIBUTION RECORDS OF UTAH SIPHONAPTERA
WITH THE DESCRIPTION OF A NEW SPECIES OF
MEGARTHROGLOSSUS JORDAN AND ROTHSCHILD 1915¹

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The initial studies on Siphonaptera in Utah by Stanford (1931, 1944), and more recently by Hubbard (1947) and others have brought to light much needed information concerning the flea fauna of Utah. Because it has not yet been determined conclusively which species of fleas are involved in the spread and maintenance of disease of sylvatic origin such as plague and tularemia, it is important and necessary to know more about the distribution and ecology of these insects.

Through the collections³ of the junior author and others, fifteen species and subspecies of fleas are herein reported for the first time as occurring in Utah. Substantiation is also made for collections of three species of fleas made by previous workers whose reports have been listed as of questionable validity. In addition, a new species of *Megarthroglossus* Jordan and Rothschild 1915 is described. The listing of fleas which follows raises the total known species and subspecies for the state of Utah to seventy-five. Information such as host, locality, date of collection, and numbers of each sex of flea collected are given when available. Collectors' names are indicated by initials only, placed in parentheses.

The writers wish to acknowledge and express appreciation to those who assisted in making this paper possible. Thanks are especially due Dr. J. S. Stanford, Utah Agricultural College, for permission to use unpublished records based upon material he and his co-workers collected. We are also indebted to Lt. Col. Robert Traub, Walter Reed Army Medical Center, who determined most of Professor Stanford's specimens and for access to his collection and for assistance in determinations; and to George P. Holland, Chief, Systematic Entomology, Division of Entomology, Department of Agriculture, Ottawa, Canada, for assistance in comparison of the new species with other members of the genus.

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- (1) Published under the auspices of the Surgeon General, Department of the Army, who does not necessarily assume responsibility for the professional opinions expressed by the authors.
 - (2) From the Department of Entomology, Army Medical Service Graduate School, Walter Reed Army Medical Center, Washington 12, D. C., and from the Department of Zoology and Entomology, Brigham Young University, Provo, Utah.
 - (3) These collections were supported (in part) by a research grant from the Microbiological Institute of the National Institutes of Health, United States Public Health Services.

Thanks are also due the following for making available specimens for study and/or assistance in determination of specimens: Dr. D Elden Beck and Dr. Vasco M. Tanner, Brigham Young University; Harold E. Stark, Western Communicable Disease Center Laboratory, United States Public Health Service; Dr. William L. Jellison and Glen M. Kohls, Rocky Mountain Laboratory, United States Public Health Service.

KEY TO COLLECTORS' NAMES

- (CK) Clyde Knudsen
(CLH) C. Lynn Hayward
(DEB) D Elden Beck
(DEH) D. Elmo Hardy
(DMA) Dorald M. Allred
(JSS) J. Sedley Stanford
(RJM) Roy J. Myklebust
(RT) Robert Traub
(VMT) Vasco M. Tanner

NEW DISTRIBUTIONAL RECORDS

Family PULICIDAE Stephens 1829

CEDIOPSYLLA INAEQUALIS INTERRUPTA Jordan 1925

Sylvilagus sp.: Zion National Park, Washington County, 17 Dec. 1950,
32 ♂ 52 ♀ (DEB) (DMA)

St. George, Washington County, 20 Dec. 1950,
1 ♂ (DEB) (DMA)

Lepus californicus: 10 mi. NW Kanab, Kane County, 21 Apr. 1951,
1 ♂ 1 ♀ (DEB) (CK)

Note: Although Stanford (1944) reported this subspecies as occurring in Utah, some workers have questioned the validity of his record. Additional records herein listed are in substantiation of Stanford's report.

ECHIDNOPHAGA GALLINACEA Westwood 1875

Neotoma lepida: Arches National Monument, Grand County, 14 July
1950, 1 ♀; 1 Aug. 1950, 1 ♀ (DMA)

Citellus variegatus: Arches National Monument, Grand County, 22
Aug. 1950, 1 ♂ (DMA)

Bluff, San Juan County, 4 May 1951,
8 ♂ 51 ♀ (DEB) (DMA)

Dipodomys merriami: Grafton, Washington County, 4 Nov. 1950,
2 ♀ (DEB) (DMA)

Sylvilagus sp.: Zion National Park, Washington County, 17 Dec.
1950, 1 ♂ 1 ♀ (DEB) (DMA)

St. George, Washington County, 20 Dec. 1950,
7 ♀ (DEB) (DMA)

Peromyscus eremicus: 15 mi. E St. George, Washington County, 19
Dec. 1950, 1 ♀ (DEB) (DMA)

PULEX IRRITANS Linnaeus 1758

- Canis latrans*: St. George, Washington County, 23 Jan. 1925,
1 ♂ 1 ♀ (VMT)
Delta Desert, Millard County, (year) 1925,
2 ♂ 3 ♀ (DEH)

Family VERMIPSYLLIDAE Wagner 1899

CHAETOPSYLLA LOTORIS Stewart 1926

- Mustela sp.*: Sardine Canyon, Cache County, 28 Dec. 1937,
4 ♂ 2 ♀ (JSS)

Family HYSTRICHOPSYLLIDAE (Tiraboschi 1904)

ATYPHLOCERAS ECHIS Jordan and Rothschild 1915

- Peromyscus eremicus*: 15 mi. E St. George, Washington County,
19 Dec. 1950, 1 ♂ (DEB) (DMA)

Note: Stanford (1944) lists a flea as "*Atyphloceras* (probably *echis*)." This record should support his report.

ATYPHLOCERAS MULTIDENTATUS C. Fox 1909

- Mouse nest: Pleasant Grove, Utah County, 16 Mar. 1951,
2 ♂ (DEB) (DMA)

- Peromyscus maniculatus*: Cedar Valley, Utah County, 25 Mar. 1951,
1 ♀ (DMA) (CLH)

- Lehi, Utah County, 28 Apr. 1951,
1 ♀ (DMA)

Note: Tipton (1950) reported a flea as "*Atyphloceras* sp. (probably *multidentatus*)." These records undoubtedly substantiate his report.

MERINGIS DIPODOMYS Kohls 1938

- Dipodomys merriami*: Grafton, Washington County, 4 Nov. 1950,
2 ♂ 2 ♀ ; 17 Dec. 1950, 5 ? (DEB) (DMA)

- Beaver Dam Wash, Washington County, 21 Dec. 1950,
10 ♂ 10 ♀ (DEB) (DMA)

- 15 mi. E St. George, Washington County, 19 Dec. 1950,
6 ♂ 11 ♀ (DEB) (DMA)

- Dipodomys microps*: Beaver Dam Wash, Washington County, 21
Dec. 1950, 1 ♀ (DEB) (DMA)

- Peromyscus eremicus*: 15 mi. E St. George, Washington County, 19
Dec. 1950, 1 ♂ 4 ♀ (DEB) (DMA)

- Citellus leucurus*: Grafton, Washington County, 18 Dec. 1950,
1 ♂ 1 ♀ (DEB) (DMA)

- Onychomys sp.*: 15 mi. E St. George, Washington County, 19 Dec.
1950, 1 ♂ 3 ♀ (DEB) (DMA)

ACTENOPHTHALMUS HEISERI McCoy 1911

- Citellus leucurus*: Rockville, Washington County, 18 Dec. 1950,
1 ♂ 1 ♀ (DEB) (DMA)

CORRODOPSYLLA CURVATA CURVATA (Rothschild 1915)

- Sorex sp.*: Bear Lake, Rich County, 14 July 1942,
2 ♀ (JSS)

CALLISTOPSYLLUS TERINUS Rothschild 1905*Peromyscus eremicus*: Grafton, Washington County, 17 Dec. 1950,
2 ♀ (DEB) (DMA)**ANOMIOPSYLLUS NUDATUS** Baker 1898*Peromyscus maniculatus*: 20 mi. S Moab, San Juan County, 8 May
1951, 1 ♂ (DMA) (RJM) (CLH) (CK)**NEARCTOPSYLLA HYRTACI** (Rothschild 1904)*Mustela arizonensis*: Logan Mountains, Cache County, 9 Dec. 1939,
1 ♂ 1 ♀ (JSS)

Family CERATOPHYLLIDAE Dampf 1908

THRASSIS PANDORAE Jellison 1937*Citellus armatus*: Logan Canyon, Cache County, 9 June 1942,
5 ♀ 1 ♂ (JSS)**THRASSIS ARIDIS** Prince 1944*Dipodomys merriami*: Beaver Dam Wash, Washington County, 21
Dec. 1950, 2 ♂ 11 ♀ (DEB) (DMA)**THRASSIS HOFFMANI** (Hubbard 1949)*Dipodomys merriami*: Beaver Dam Wash, Washington County, 21
Dec. 1950, 2 ♂ 14 ♀ (DEB) (DMA)Grafton, Washington County, 17 Dec. 1950,
2 ♂ 2 ♀ (DEB) (DMA)*Onychomys sp.*: 15 mi. E St. George, Washington County, 19 Dec.
1950, 1 ♂ (DEB) (DMA)**ORCHOPEAS SEXDENTATUS NEOTOMAE** Augustson 1943*Peromyscus maniculatus*: Grafton, Washington County, 4 Nov, 1950,
1 ♀ (DEB) (DMA)**MONOPSYLLUS EUMOLPI CYRTURUS** Jordan 1929*Eutamias minimus*: Mammoth, Juab County, 7 Apr. 1951,
1 ♀ (DEB) (CLH) (DMA)*Eutamias quadrivittatus*: N Fork Provo Canyon, Utah County, 22
June 1951, 1 (?) (DMA)*Citellus armatus*: Strawberry Reservoir, Wasatch County, 28 June
1951, 1 ♀ (DMA)**PEROMYSCOPSYLLA HAMIFER VIGENS** (Jordan 1937)*Microtus sp.*: Logan Canyon, Cache County, 1 Oct. 1948,
5 ♂ 5 ♀ (RT)

Family HYSTRICHOPSYLLIDAE

Subfamily ANOMIOPSYLLINAE

MEGARTHROGLOSSUS **BECKI** Tipton and Allred, sp. nov.DIAGNOSIS: The principal distinguishing characteristic by which
this species may be separated from other *Megarthroglossus* is the
dorso-caudal extension of the eighth sternum, becoming sub-acumi-

nate apically and enclosing the proximal half of the distal arm of the ninth sternum in a hyaline sheath, whereas in other members of the genus the eighth sternum is not produced distad beyond the proximal one-third of the distal arm of the ninth sternum, and is never acuminate or subacuminate but rounded. Near *M. divisus divisus* (Baker 1895), but differs slightly in shape and chaetotaxy of the ninth sternum and movable finger and immovable process of the clasper; sinus of the seventh sternum of the female is truncate and definite, not shallow and rounded; the ventro-caudal lobe of the seventh sternum is acuminate, not rounded.

DESCRIPTION: HEAD (fig. 1, Male). Frontal tubercle present. Frontoclypeal area porose. Ocular row of four bristles; the first and third about half as long as the second and fourth; the first dorsally displaced. Eye vestigial, triangular, slightly pigmented. Genal process sub-acuminate. Maxillary lobe acuminate, reaching to or beyond base of second segment of labial palpus. Labial palpi 5-segmented; almost entire last segment reaching beyond apex of fore-coxa. Bristles of second antennal segment very short, not reaching beyond third segment of clavus. Row of small bristles on dorsal margin of antennal fossa. Two rows of bristles on post antennal area, each row with three small dorsal bristles (four in female) and one large ventral bristle; ventral bristle of second row reaching beyond apex of pronotal teeth.

THORAX: (fig. 1, Male). Pronotum (PN.) with one row of bristles anterior to pronotal comb, with bristles alternately long and short; the ventral-most bristle very long and stout. Pronotal comb of sixteen spines. Mesonotum (MSN.) with four rows of bristles, first row irregular, second and third rows incomplete, bristles of fourth row longest with alternating long and short bristles; row of three pseudobristles on mesonotal flange. Mesepisternum (MPS.) with one long bristle in ventro-caudal angle (in one paratype male bristle lies over internal ridge) and five smaller bristles (seven in female) ranging dorso-anteriorly. Mesepimere (MPM.) with one long ventral bristle. Metanotum (MTN.) with two rows of bristles, the first incomplete, the bristles of the second row longest. Lateral metanotal area very small and not readily evident, with one bristle. Plural arch absent. Metepisternum (MTS.) with one bristle near caudal margin (in female two bristles, the ventral four times longer than the dorsal). Metepimere (MTM.) with one bristle near caudal margin (in female two bristles, one medial and one caudal).

LEGS: Measurements.

Male:	Leg	Tibia	1	2	3	4	5
	Pro-	183	63	63	53	43	110
	Meso-	263	123	96	60	50	120
	Meta-	346	230	133	60	50	126

Tarsal Segments

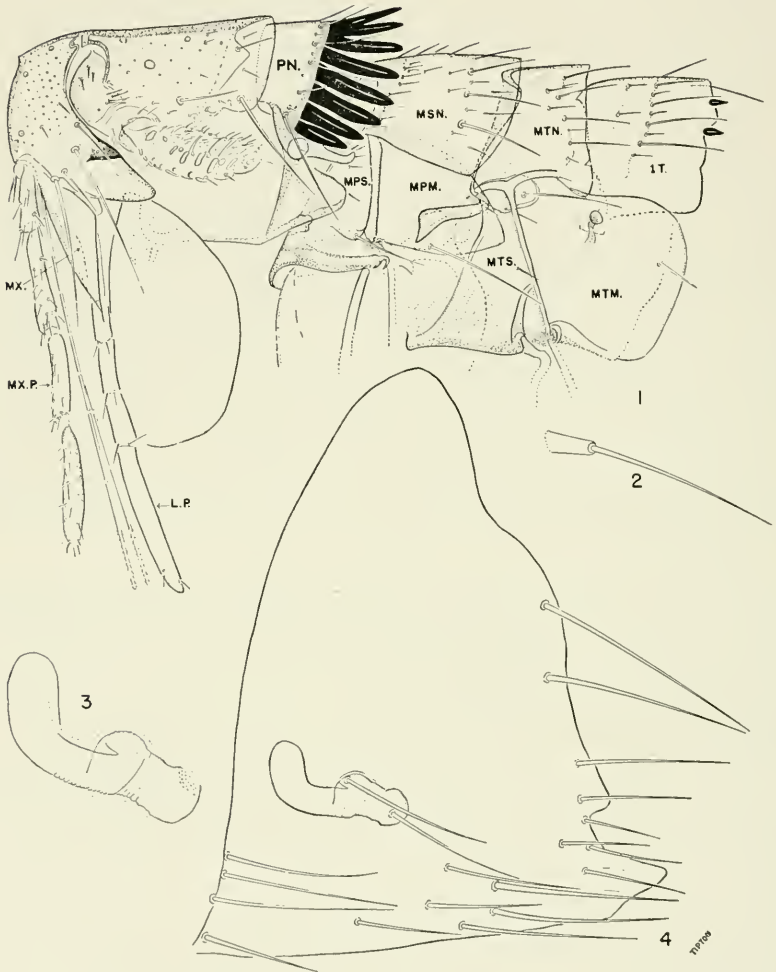


Plate I. *Megarthroglossus becki*, new species.

- Fig. 1. Head and Thorax (Male)
- Fig. 2. Anal Stylet (Female)
- Fig. 3. Spermatheca (Female)
- Fig. 4. Seventh Sternum (Female)

		Tarsal Segments					
Female:	Leg	Tibia	1	2	3	4	5
	Pro-	206	70	73	60	53	116
	Meso-	326	143	100	63	50	116
	Meta-	400	293	170	73	63	123

ABDOMEN: First abdominal tergum (1T., fig. 1) with two rows of bristles (one row in female), first row incomplete; two apical spinelets on first tergum and one on second tergum (female with one apical spinelet on first tergum and second tergum without spinelets). Terga 2 to 6 with one row of bristles. Sterna 2 to 6 with one row of bristles.

MODIFIED ABDOMINAL SEGMENTS: MALE. Eighth sternum (8S., fig. 6) without bristles; extending dorso-caudally to encompass proximal half of distal arm of ninth sternum in hyaline sheath. Distal arm of ninth sternum (D.A.9, fig. 6) enlarged medially, narrowing apically to become sub-acuminate, with ten bristles on caudal margin and four small mesal bristles; several very fine bristles apically and on anterior margin. Apex of immoveable process of clasper (P., fig. 5) subrounded; anterior to apex of process a prominent gland of unknown function but constant in size and shape in all type specimens; caudal margin of process of clasper undulate with a rounded protuberance slightly more than half the distance between apex of process and its junction with moveable process of clasper; four bristles on caudal margin above rounded protuberance, the most ventral being smallest; 2 and 3 more widely separated than 1 and 2, with two small mesal bristles slightly anterior to the three bristles; two small bristles on apex of process with two small mesal bristles anterior to these and two small bristles on dorsal margin. A row of very minute bristles extending from apex of clasper ventrad to about one-half of the distance to point of articulation of moveable finger of clasper. Moveable finger of clasper (F., fig. 5) $3\frac{1}{2}$ times as long as wide; anterior margin almost straight; posterior margin evenly curved; apex rounded; one long thin bristle on caudal margin near apex with a shorter thin bristle on either side; a fourth thin bristle one-half the distance from apex to base, and another near the base; a long thin bristle ventral to point of junction of P. and F. Other small setae on F.; three antepygidial bristles, the middle twice as long as the ventral and the dorsal bristle minute.

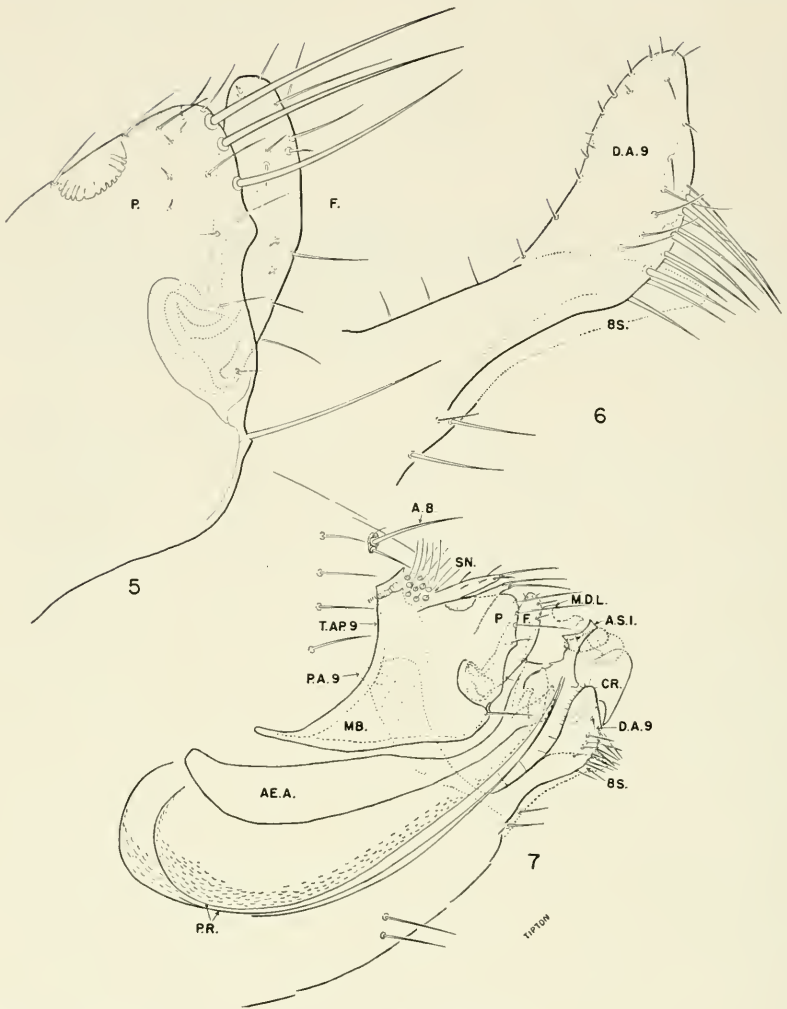


Plate II. *Megarthroglossus becki*, new species.

- Fig. 5. Immoveable process and moveable finger of clasper (Male)
 Fig. 6. Distal arm of ninth sternum
 Fig. 7. Modified abdominal segments (Male)

FEMALE: Dorsal four-fifths of posterior margin of VII sternum (fig. 4) broadly undulate; lower one-fifth with angulate; ventro-caudal area a sub-acuminate lobe. Anal stylet (fig. 2) with a single apical bristle. Head of spermatheca (fig. 3) as long as tail; base and apex

of head of almost equal width with slight constriction in middle. Tail obtuse-angulate. Three antepygidial bristles, the central one longest.

LENGTHS: MALE. 2.14 mm

FEMALE. 2.44 mm

HOLOTYPE: A male, from Buckley's Mine, lower level, Rock Canyon, near Provo, Utah County, Utah. Elevation, approximately 5100 feet. Collected by Donald M. Allred, November 24, 1949. In the collection of U. S. National Museum. Host: Nest of *Neotoma cinerea acraia* (Elliot).

ALLOTYPE: A female, same data as above except from different nest on upper level, elevation 5200 feet. Deposited in U. S. National Museum.

PARATYPES: Two males and two females, same data as the holotype. Deposited in collection of senior author, and collection of Brigham Young University.

REMARKS: This species is named for Dr. D. Elden Beck, Associate Professor of Zoology and Entomology, Brigham Young University, to whom the authors are very much indebted for his contagious and enthusiastic interest in ectoparasites.

LIST OF ABBREVIATIONS¹

AE.A.	Aedeagal apodeme
A. B.	Antepygidial bristles
A.S.I.	Apex of sclerotized inner tube
CR.	Aedeagal crochets
D.A.9	Distal arm of male ninth sternum
F.	Moveable finger of clasper
L.P.	Labial palpi
MB.	Manubrium
M.D.L.	Median dorsal lobe of aedeagus
MPM.	Mesepimeron
MPS.	Mesepisternum
MSN.	Mesonotum
MTM.	Metepimere
MTN.	Metanotum

M.T.S.	Metepisternum
MX.	Maxillary lobe
MX. P.	Maxillary palpi
P.	Immoveable process of clasper
P.A.9	Proximal arm of male ninth sternum
PN.	Pronotum
P.R.	Penis rods
SN.	Sensillum
T.AP.9	Ventral margin of apodeme of ninth tergum
8S.	Eighth sternum
1T.	First tergum

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(4) Nomenclature used is that of Traub's (1950).