A list of arthropods of medical importance which occur in Utah with a review of arthropod-borne diseases endemic in the state

Vernon J. Tipton
Department of Zoology, Brigham Young University, Provo, Utah

Robert C. Saunders
Department of Zoology, Brigham Young University, Provo, Utah
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INTRODUCTION

The information contained in this paper has been assembled for the express purpose of demonstrating lacunae in current knowledge of health problems associated with arthropods in Utah. Obviously it is not definitive, nor is it intended to be, but rather it should serve as a base for future research investigations. It will be modified as additional information becomes available.

Not all of the arthropods in this list are of proven medical importance—indeed many of them are of doubtful importance—but they are included in the list because they are close relatives of species which are of medical significance in other areas and their potential for affecting the health of man has not yet been fully investigated.

Some difficulties are inherent in a review of the history of arthropod-borne diseases, particularly in rural areas. Records are incomplete and their accuracy is suspect. Some arthropod-borne diseases are not included on the standard state report form and thus in many instances are not reported. In rural areas, where many arthropod-borne diseases occur, people may not seek medical care because of tradition or because no care is available. Diagnostic techniques are slow to reach rural areas and receive broad acceptance. Unless the index of suspicion is high, physicians are prone to ignore diagnostic tests necessary for specific discrimination. However, the history of tularemia in Utah provides ample evidence that rural medicine does not necessarily mean archaic methods and techniques. Dr. Richard A. Pearse, a Brigham City physician, published a clinical description of tularemia in humans which is considered to be the first account in the English language (Jellison, 1971). Many of the early epidemiological investigations of tularemia were conducted in the rural community of Delta and were prompted by the astute observations of local physicians.

COLORADO TICK FEVER:

The work of Becker (1926, 1930) demonstrated that Colorado tick fever (CTF) is a disease entity distinct from Rocky Mountain spotted fever (RMSF) but it was not until 1940 that Topping, Cullyford, and Davis (1940) provided the first detailed clinical description of CTF. Consequently, accurate data on the incidence of CTF prior to 1940 are not available. Records of cases of CTF in Utah from 1940 to 1959 maintained by the Rocky Mountain Laboratory in Hamilton, Montana, are probably the most reliable but may be incomplete because information is based on CTF virus isolated from the blood of Utah residents at Hamilton and undoubtedly there were patients who were hospitalized elsewhere or not at all. Prior to 1960 the accuracy of records of CTF is in question because diagnostic techniques for the arboviruses were in their infancy. Comparatively simple but reliable tests are available but physicians may not utilize them either because of inconvenience or they may not be aware that the CTF virus persists for approximately 90 days after onset. Because of their epidemiological and clinical similarities CTF has been confused with RMSF. In children CTF may cause encephalitis-like symptoms and even death (Eklund, Kennedy, and Casey, 1961) but probably there are few inapparent infections in a population. It is possible that many mild cases have escaped detection and have not been reported. According to Pratt and Rice (1969) there were only 96 cases of CTF reported in Utah during the period from 1956 to 1969 compared with 1,717 cases in Colorado during the same period. However, the low incidence of CTF in Utah may not be a

*Department of Zoology, Brigham Young University, Provo, Utah
true measure of its significance. There is no immunization available and treatment consists of supportive care.

*Deinococcus andersoni* Stiles is considered to be the most important vector in the epidemiological pattern involving man. However, CTF virus has been isolated from ticks of several other species indicating that they may play an important role in the cycle in nature. Ecological studies aimed at determining epidemiological patterns in nature and particularly the identity of reservoir animals are needed.

**The Encephalitides:**

Cases of western encephalitis (WE) and perhaps other encephalitides have probably occurred in humans and horses in Utah prior to the outbreak of 1933. However, the etiology and epidemiology of the encephalitides had not yet been elucidated, and one can only speculate about the prevalence of arthropod-borne viral agents in horses and humans prior to that date. In the Register of Deaths at the Salt Lake City Health Department, Bureau of Vital Statistics, brain fever was listed as the cause of death in several instances during the 1847-1865 period. It is possible that at least some of these deaths were due to infections with arboviruses.

The 1933 episode described by Madsen (1934) occurred in two waves, both of which began in the West Point area of Weber County. The first wave began about July, reached a peak about 10 August, and had almost completely subsided by 1 September. Madsen estimated that 1,139 sick horses were involved in the first wave, of which 43.9 percent died. The second wave, which began the middle of September and subsided about 1 November, involved 2,819 horses, of which about 53.2 percent died. The main focus of infection was in Salt Lake, Davis, Box Elder, Cache, and Weber counties in Utah and Franklin County in Idaho, but there were isolated cases in Rich, Summit, Morgan, Utah, and Tooele counties. An outbreak among humans occurred twenty-five years later (in 1958) in the same general locality in northern Utah and represents the largest number of cases reported in Utah for a single year (Jenkins and Donath, 1959). Serological studies revealed a high number of inapparent infections. Thomas and Smith (1959) conducted a survey on infection rates in mosquitoes, birds, and mammals and found that the highest infection rates in chickens and mosquitoes occurred in the geographical center of the human outbreak. In connection with the 1958 outbreak, Rees et al. (1959) concluded:

1. There was in Utah in 1958 a recognized outbreak of Western Equine Encephalitis in man;
2. It was accompanied by a tremendous increase in the numbers of *C. tarsalis* mosquitoes;
3. *Culex tarsalis* mosquitoes were avidly feeding on man in considerable numbers during this period; and
4. Some *C. tarsalis* mosquitoes were harboring the Western equine strain of encephalitis virus.

Local physicians reported an extensive outbreak of human encephalitis of unconfirmed etiology in Box Elder County in 1936. In Weber County in 1956 there was a serologically confirmed case of St. Louis encephalitis and in 1957 a fatal case of SLE plus two cases of WE, one of which was fatal. There were 525 cases of equine encephalitis from 1955 to 1969, including 244 cases in the outbreak of 1958. There is no evidence of arbovirus activity in Weber County from 1933 to 1955. During recent years along the Wasatch front there have been occasional cases of a disease, difficult to diagnose but typical of western encephalitis. Physicians do not routinely submit acute and convalescent sera necessary for definitive diagnostic tests. Some additional information is needed on feeding preferences of mosquitoes and the role of passerine birds in the epidemiology of WE in areas where there have been active foci in the past. The fate of arboviruses during periods between epidemics is a perennial problem requiring investigation.

Other arboviruses which have been isolated in Utah include Hart Park-like isolates from *Culex tarsalis*. California encephalitis group isolates from *Anopheles freeborni*, *Culiseta inornata*, *Aedes dorsalis*, *A. nigromaculatus*, *Culex erythrothorax*, *Psorophora signipennis*, and *Culex tarsalis* and Cache Valley isolates from *Culiseta inornata* and *Anopheles freeborni* (Holden and Hess, 1959; Crane et al., 1970; and Elbel et al., 1971).

**Rocky Mountain Spotted Fever:**

Beck (1955) reviewed the history of Rocky Mountain spotted fever (RMSF) in Utah. It is not certain when RMSF first occurred in the state, but probably the disease was prevalent among early settlers. Beck (loc. cit.) reproduced a newspaper article, published in 1941, in which Dr. William M. McKay, acting commissioner of health for the state of Utah during that period, speculates that Brigham Young was afflicted with RMSF at the time he entered Salt Lake Valley. Some support for this view is supplied by Byington (in Beck, 1955) who believed that "mountain fever" was the same as RMSF. In the Register of Deaths at the Salt Lake City Health Department, Bureau of Vital Statistics,
several deaths are recorded for which the cause is listed as "mountain fever." Although there is insufficient evidence to establish a definitive relationship between the two, the season during which the deaths occurred is consistent with the epidemiology of RMSF. We do not overlook the possibility that "mountain fever" could be Colorado tick fever which also occurs in Utah under similar circumstances. The deaths for which "mountain fever" was listed as the cause occurred as follows: two in July and one in August of 1849; one in June and five in July of 1850; two in early November of 1854; and one in late May and two in September of 1855. In at least one instance the cause of death was given as "intermittent mountain fever." In the majority of cases the victims were adult males.

_Dermacentor andersoni_ Stiles is considered to be the most important vector involved in human cases of RMSF in Utah although there may be other species important in the perpetuation of the disease in nature. Beck (1955) and Coffee (1953) gave data on seasonal and altitudinal distribution as well as life cycles of tick vectors of RMSF.

Jellison (1945) considers the cottontail rabbit, _Sylvilagus nuttalli_ Bachman to be an important component of the RMSF biocenose. It is a vagile animal with a fairly high degree of ecological tolerance. Studies of the population dynamics of the ectoparasites of the cottontail rabbit may suggest ecological patterns which help to perpetuate the disease in nature.

From 1915 through 1969 the Utah State Department of Health, Bureau of Vital Statistics, recorded 496 cases of RMSF in Utah among both residents and nonresidents. Cases occurred most frequently during the months of June, July, and August, although others were reported as early as April and as late as November. Among arthropod-borne diseases with endemic foci in Utah, RMSF is second only to tularemia in total number of cases reported in the state.

**Plague:**

The recorded history of plague in Utah is not dramatic, but nonetheless, plague represents a disease of great potential significance because of the widespread distribution of capable vectors and reservoirs in the state and the increasing number of fishermen and campers who invade the plague biocenose each year. There have been only two confirmed human cases (in 1936 and 1966) and one doubtful case (in 1939) reported in the state.

According to Allred (1952) and Beck (1955), capable vectors of plague are indige-
3. 1910, by R. A. Pearse, Brigham City, Utah. Dr. Pearse refers to six cases, which occurred in the month of August, caused by the bite of a fly, on the exposed parts of the body (neck, ear, cheek, wrist, ankle, and hand). After an incubation period of from two to five days . . . In 1919 and 1920, I studied seven cases of deer-fly fever near Fillmore, Millard County, Utah, and found them positive for tularemia, clinically, culturally, and serologically. The cases occurred in June, July and August during the seasonal prevalence of the fly Chrysops discalis. The sites of the fly bites were the neck, temple, ear, and posterior surface of the lower third of the thigh. In all cases, suppurative lesions appeared in the glands draining the bitten area. All patients had fever; one died on the twenty-sixth day of illness. I heard of perhaps two dozen other cases in the general community in which I worked. From seventeen jackrabbits, sick or dead, in the community I isolated *Bacterium tularensis*, thus establishing the great reservoir of infection.

In an earlier publication, Francis (1922) gives a more specific location of tularemia foci in Utah.

So far as known there have been but two foci of infection in Utah. The focus here reported is in Millard County, 5 miles (8 kilometers) west of Holden, 5 miles northwest of Fillmore, 25 miles (40 kilometers) southeast of Delta, and 120 miles (193 kilometers) south of Salt Lake City. The other focus has received clinical confirmation and is located near Brigham, a town 20 miles (32 kilometers) north of Ogden in Box Elder County. Both foci have probably existed for at least fifteen years.

Although tularemia does not usually occur in epidemic form, Hillman and Morgan (1937) reported an outbreak of 26 cases among a group of 170 enrollees of a Civilian Conservation Corps camp "located on the treeless plains north of Great Salt Lake." They suggested that the epidemiological evidence available pointed to deer flies as the vectors and jackrabbits as the reservoirs. The cases were diagnosed between 11 and 30 July 1935. There was a noticeable increase in the population of deer flies the week before the onset of the first case. Several men in the camp experienced multiple bites, and lesions on tularemia victims were on uncovered portions of the body. Jackrabbits were numerous; many were dead and several were lethargic.

Locomotive Springs, the site of the Civilian Conservation Corps camp, is in the general area of Tremonton where Pearse had seen cases in 1908 and 1910.

Russian workers have proposed subspecific designations for the causative agents of tularemia which have been accepted by most North American workers. *Francisella tularensis tularensis* of North America is usually associated with rabbits and arthropods while the more cosmopolitan form, *Francisella tularensis palaearctica* appears to be transmitted independent of arthropods and has been isolated from aquatic or semiaquatic rodents. An organism isolated from a water sample collected in Utah was given the name *Francisella novicida* (Larson, Wicht, and Jellison, 1955). All three forms have been found in Utah. *Francisella tularensis tularensis* is the principal cause of human tularemia but *Francisella tularensis palaearctica*, isolated from muskrats, should be mentioned because of its importance in Utah.

According to the records of the Utah State Department of Public Health, Bureau of Vital Statistics, there have been 986 cases of tularemia in the state during the 45-year period from 1925 through 1969. Approximately three-fourths of these cases occurred during the twenty-year period from 1935 to 1954.

*Chrysops discalis* has been shown to be an efficient experimental vector of tularemia; it has been known to bite man (Jellison, 1950). For these reasons it has been suspected of being the most important deer fly vector of tularemia in Utah. However, Cox (1965) found *C. discalis* to be less abundant than *C. fulvaster* and *C. aequans* in study areas near Utah Lake. Moreover, he isolated *F. tularensis* from three of 73 pools of deer flies. Two isolates were obtained from two pools of *C. fulvaster* and one isolate from one pool of *C. aequans*.

There is a particular need for investigation of seasonal and geographic distribution of species of *Chrysops* and the animals on which they feed, the duration of infection in reservoirs and vector species, and serological surveys of human populations in areas where there are high density populations of deer flies.

**Malaria:**

Most cases of malaria which have occurred in the state were contracted elsewhere, but Marshall and Rees (1948), in their excellent review of malaria in Utah, have provided substantial evidence that local transmission has taken place, particularly in southern Utah. They point out that most of the early Utah settlers came from the Mississippi Valley where malaria was prevalent. Contact with the outside world was maintained through continuing immigration, returning missionaries, and settlers passing through on their way to California or Oregon. Perhaps the only case of malaria in Utah sufficiently well documented to be consid-
In the Register of Deaths at the Salt Lake City Health Department, Bureau of Vital Statistics, there are several entries in which “malignant fever” and “bilious fever” are listed as the cause of death. Early physicians made the distinction among “fever,” “mountain fever,” “malignant fever,” “bilious fever,” and “typhoid fever,” and although it would be inaccurate to associate malignant fever or bilious fever with malaria, there is a possibility that a persistent fever occurring during the summer months could be malaria.

In a five-year period from 1943 through 1947, 723 cases of malaria were reported in Utah and reflect the impact of returning servicemen on the incidence of disease within the state. There was another less dramatic rise in the incidence of malaria in Utah, associated with the Korean War, during the period from 1951 to 1955 when 75 cases were reported. Nevertheless, with an adequate reservoir of infection, capable vectors, and a susceptible resident population, malaria has not become established in Utah. Rapid diagnosis and treatment of servicemen, improved mosquito control, and an informed public are the principal factors which mitigate the importance of malaria in Utah. The feeding habits of the mosquito vectors in a rural setting may be another factor of some importance. Cattle and horses are the preferred sources of blood meals for some Anopheles species.

MISCELLANEOUS:

Relapsing fever is virtually unknown in Utah, although it has been reported on several occasions from surrounding states. Davis (1939) reported a single case which occurred near Salt Lake City in 1928. Both Ornithodoros parkeri and O. turicata, proven vectors of relapsing fever, occur in the state although their distribution is not completely known.

Coxiella burnetti, the causative agent of Q fever, has been isolated from rodents (Dipodomys ordii, D. microps, and Peromyscus maniculatus) and a tick (Dermacentor parumapertus) in the Great Salt Lake Desert in Utah. C. burnetti antibodies were demonstrated serologically in Lepus californicus, Onychomys leucogaster, and Eutamias minimus (Stoeren et al., 1959). There is no record of Q fever in

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<td>16</td>
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<td>16</td>
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</table>

*Represents isolations from patients hospitalized at Rocky Mountain Laboratory, Hamilton, Montana.
**One case of S.L.E.
humans in Utah, but this may be due to faulty diagnosis or reporting, inasmuch as human cases have occurred in surrounding states.

Mohr (1951), in his paper on the distribution of murine typhus and plague in the United States, gives no records of murine typhus for the state of Utah. The flea index of Xenopsylla cheopis on Rattus sp. apparently has never been very high in Utah, and probably accounts for the absence of the disease in the state.

Armstrong (1922) reported an epidemic of typhus on the San Juan Indian Reservation during the last half of 1920 and the first half of 1921 in which there were 63 cases of typhus with 27 deaths among approximately 7,000 Indians. The San Juan Indian Reservation is 5,584 square miles in the four-corners area of New Mexico, Arizona, and Utah.

One case of dengue was reported in 1942, but it was probably contracted outside the state.

One doubtful case of rickettsialpox has been reported from Utah (Pratt and Rice, 1969).

In Utah the incidence of bites and stings of arthropods and the number of cases of dermatitis caused by urticating and vesicating insects is unknown. Scattered cases of arachnidism have been reported, including at least one death from the sting of a hymenopterous insect. Latrodectus hesperus Chamberlin and Ivie and several species of Hymenoptera are the most important venomous arthropods in the state.

Tick paralysis, caused by the bite of female ticks, Dermacentor andersoni Stiles, occurs most frequently in an area comprising the northern part of Idaho and adjacent portions of Washington and Montana. Isolated cases have been reported in other sections of the Rocky Mountains where Dermacentor andersoni occurs (Philip, 1969). Insofar as we are aware there have been no cases of tick paralysis reported in Utah, but the possibility of its occurrence should not be overlooked.

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LIST OF ARTHROPODS

ARACHNIDA

I. Acarina: Isotomidae

A. Argasidae

1. Argas
   A. cooleyi Kohls and Hoogstraal, 1960
   A. gigonticus Kohls and Clifford, 1968
   A. sanchezi Dugès, 1887

2. Ornithodoros
   O. couchanus Cooley and Kohls, 1941
   O. crassus Cooley and Kohls, 1941
   O. kelleyi Cooley and Kohls, 1941
   O. parkeri (Cooley, 1936)
   O. sparrus Kohls and Clifford, 1963

3. Otobius
   O. meginni (Dugès, 1884)
   O. lagophillus Cooley and Kohls, 1940

B. Ixodidae

1. Dermacentor
   D. albipictus (Packard, 1869)
   D. andersoni Stiles, 1908
   D. hunteri Bishopp, 1912
   D. parvum Neumann, 1901

2. Haemaphysalis
   H. leporispalustris (Packard, 1869)

3. Ixodes
   I. angustus Neumann, 1899
   I. jellisoni Cooley and Kohls, 1938
   I. kingi Bishopp, 1911
   I. marmota Cooley and Kohls, 1938
   I. muris Bishopp and Smith, 1937
   I. ochotonae Gregson, 1941
   I. pacificus Cooley and Kohls, 1943
   I. sculptus Neumann, 1904
   I. sorics Gregson, 1942
   I. spinipalpis Hadwen and Nuttall, 1916
   I. texanus Banks, 1906
   I. woodi Bishopp, 1911

4. Rhipicephalus
   R. sanguineus (Latreille, 1806)

I'. Acarina: Mesostigmata

A. Dermanyssidæ

1. Dermanyssus
   D. gallinae (De Ceer, 1778)

2. Hirstionyssus
   H. bicotus Allred, 1957
   H. cymonius (Radford, 1941)
   H. cutimiae Allred and Beck, 1966
   H. femuralis Allred, 1957
   H. hilli (Jameson, 1950)
   H. inceptus (Eads and Hightower, 1952)
   H. isabellinus (Oudemans, 1913)
   H. latischutatus (de Meillon and Lavoipierre, 1944)
   H. longichelae Allred and Beck, 1966
   H. nematonae (Eads and Hightower, 1951)
   H. occidentalis (Ewing, 1923)
   H. paraffinis Herrin, 1970
   H. perognathi Herrin, 1970
   H. staffordii Strandmann and Hunt, 1951

   H. talpae Zemskaïa, 1955
   H. thomonymus Allred and Beck, 1966
   H. torus Allred and Beck, 1966
   H. triacanthus (Jameson, 1950)
   H. utahensis Allred and Beck, 1966

3. Liponyssoidæ
   L. becki (Allred, 1957)
   L. sanguineus (Hirst, 1914)

4. Myonysus
   M. montanus Furman and Tipton, 1955

B. Haemogamasidae

1. Brevisternum
   B. montanus (Ewing, 1922)
   B. utahensis (Ewing, 1922)

2. Eulachaps
   E. stabularis (Koch, 1836)

3. Haemogamasus
   H. alaskensis Ewing, 1925
   H. barberi (Ewing, 1925)
   H. nidiformis Bregetova, 1955
   H. occidentalis (Keegan, 1951)
   H. pontiger (Berles, 1903)

4. Icerya hydras
   I. armatus Keegan, 1951
   I. furmani Keegan, 1951

C. Halarachnidae

1. Zumptiella
   Z. bakeri (Furman, 1954)

D. Laelapidae

1. Audrolaelaps
   A. circularis (Ewing, 1933)
   A. crototi Jameson, 1947
   A. debilis Jameson, 1950
   A. fenulis (Megnin, 1876)
   A. geomyus Strandmann, 1949
   A. glasgoi (Ewing, 1925)
   A. hollisteri (Ewing, 1925)
   A. leuculus Eads, 1951

2. Hyundaiae
   H. gurahensis (Fox, 1946)
   H. habrae Oudemans and Voigts, 1904

3. Laelaps
   L. incilis Allred and Beck, 1966
   L. kochi Oudemans, 1936
   L. multispinosus Banks, 1909
   L. nuttalli Hirst, 1915

E. Macronyssidae

1. Chrioptonyssus
   C. robini (Ewing, 1925)

2. Ornithonyssus
   O. aridus Furman and Radovsky, 1963
   O. bacoti (Hirst, 1913)
   O. silvanus (Canestrini and Fangazo, 1877)

3. Steatonyssus
   S. antrozol Radovsky and Furman, 1963

F. Rhinonyssidae

1. Paracoptonyssus
   P. iberidius Strandmann and Furman, 1956
G. Spinturnicidae
1. Paraspinturnix
   *P. globosus* Rudnick, 1960
2. Spinturnix
   *S. orri* Rudnick, 1960

I”. Aracina: Orilathei
   Garabodidae
   *Passalozetes*
   *P. lineatus* Higgins and Woolley, 1962

I”’. Aracina: Trombidiformes
A. Trombiculidae
1. Acomatacarus
   *A. arizonensis* Ewing, 1942
2. Chatia
   *C. ochatona* (Radford, 1942)
   *C. setosa* Brennan, 1946
3. Cheladonta
   *C. crossi* Lipovsky, Crossley, and Loomis, 1955

4. Euschoengastia
   *E. cordicenus* Brennan, 1948
   *E. cruciger* Brennan, 1948
   *E. cynomyscidae* Crossley and Lipovsky, 1954
   *E. decipiens* Gould, 1956
   *E. fassola* Brennan and Beck, 1955
   *E. furmani* Gould, 1956
   *E. hoffmanae* Gould, 1956
   *E. lanceolata* Brennan and Beck, 1955
   *E. lanci* Brennan and Beck, 1955
   *E. lutrodema* Brennan, 1948
   *E. obca* Brennan and Beck, 1955
   *E. orogenensis* (Ewing, 1929)
   *E. pomerantzi* Brennan and Jones, 1954
   *E. radfordi* Brennan and Jones, 1954
   *E. rotunda* Brennan and Beck, 1955
   *E. sculpturata* (Ewing, 1925)
   *E. sordidum* Gould, 1936

5. Euschoengastoides
   *E. lacerta* (Brennan, 1948)
   *E. hoplia* (Loomis, 1954)
   *E. utahensis* (Brennan and Beck, 1955)

6. Entrombicula
   *E. belkinii* (Gould, 1950)

7. Hexidionis
   *H. allredi* (Brennan and Beck, 1955)
   *H. doremi* (Brennan and Beck, 1955)

8. Hyponoeula
   *H. arcticola* (Loomis, 1954)
   *H. montanaeans* (Brennan, 1946)

9. Gohrlicia
   *G. americana* (Ewing, 1942)

10. Leucencephalia
    *L. americana* (Ewing, 1942)

11. Leptotrombidium
    *L. myotis* (Ewing, 1929)
    *L. panamensis* (Ewing, 1925)
    *L. potosina* (Hoffman, 1950)

12. Miyatrombicula
    *M. esenisi* (Sasa and Ogata, 1953)
    *M. sargenti* (Brennan, 1952)

13. Neoschocngastia
    *N. americana* (Hirst, 1921)

14. Neotrombicula
    *N. californica* (Ewing, 1942)
    *N. harperi* (Ewing, 1928)
    *N. juetetti* (Brennan and Wharton, 1950)
    *N. microti* (Ewing, 1928)
    *N. subimaginalis* (Brennan and Wharton, 1950)

15. Odontacarus
    *O. hirsutus* (Ewing, 1931)
    *O. lindsdalei* (Brennan and Jones, 1954)
    *O. micheneri* Greenberg, 1952

16. Trombicula
    *T. bakeri* Ewing, 1946
    *T. kudos* Loomis, 1954
    *T. unicolor* Brennan, 1965

17. Whartonia
    *W. perplexa* (Brennan, 1947)

B. Myobiidae
    *Radfordia*
    *R. bachai* Howell and Elzinga, 1962
    *R. lebenn* (Koch, 1841)
    *R. subuliger* Ewing, 1938

II. Araneida
A. Loxoscelesidae
    *Loxosceles*
    *L. unicolor* Keyserling, 1887

B. Theridiidae
    *Latrodectus*
    *L. hesperus* Chamberlin and Ivie, 1935

III. Scorpionida
A. Buthidae
    *Centruroides*
    *C. sculpturatus* Ewing, 1928

B. Vejovidae
1. *Anuroctonus*
   *A. phaioptodactylus* (Wood, 1863)

2. *Hadrunus*
   *H. arizonensis* Ewing, 1928
   *H. spadix* Stahnke, 1940

3. *Vejorid*
   *V. becki* Gertsch and Allred, 1965
   *V. boreus* (Girard, 1845)
   *V. concusus* Stahnke, 1940
   *V. utahensis* Williams, 1968
   *V. warapiensis* Stahnke, 1940

INSECTA

I. Anoplura
A. Haematopinidae
    *Haematopinus*
    *H. asini* (Linnaeus, 1758)
    *H. eurysternus* (Nitzsch, 1818)
    *H. suis* (Linnaeus, 1758)

B. Hoplopleuridae
1. *Enderleinella*
    *E. marmotta* Ferris, 1919
    *E. osborni* Kellogg and Ferris, 1915
    *E. paralongipes* Kim, 1966
    *E. saturadis* (Osborn, 1891)
    *E. tamiasciuri* Kim, 1966
2. *Fahrenholzia*
   *F. pinatua* Kellogg and Ferris, 1915
   *F. reducta* Ferris, 1922

3. *Haemodipus*
   *H. lyrioccephalus* (Burmeister, 1839)
   *H. setoni* Ewing, 1924
   *H. vorticicrus* (Denny, 1842)

4. *Hoplopleura*
   *H. acanthopus* (Burmeister, 1839)
   *H. arboricola* Kellogg and Ferris, 1915
   *H. capitosa* Johnson, 1960
   *H. difficiliis* Kim, 1965
   *H. erratica* (Osborn, 1896)
   *H. ferrisi* Cook and Beer, 1959
   *H. hesperomydis* (Osborn, 1891)
   *H. onychomysis* Cook and Beer, 1959
   *H. pacifica* Ewing, 1924
   *H. reithrodontomydis* Ferris, 1951
   *H. sciuriola* Ferris, 1921
   *H. trispinosa* Kellogg and Ferris, 1915

5. *Neohahoaophius*
   *N. citellinus* Ferris, 1942
   *N. inornatus* (Kellogg and Ferris, 1915)
   *N. lactanculus* (Grube, 1851)
   *N. marmota Ferris, 1923
   *N. neotomae* Ferris, 1942
   *N. pacificus* Kellogg and Ferris, 1915
   *N. sciuri Jancke, 1931
   *N. sciuroptera* (Osborn, 1891)
   *N. semifasciata* Pratt and Stojanovich, 1961

6. *Polyplax*
   *P. alaskanus* Ewing, 1927
   *P. auricularis* Kellogg and Ferris, 1915
   *P. borcalsis* Ferris, 1933
   *P. serrata* (Burmeister, 1839)
   *P. spinulosa* (Burmeister, 1839)

C. *Linognathidae*

1. *Linognathus*
   *L. africanus* Kellogg and Paine, 1911
   *L. pedalis* (Osborn, 1896)
   *L. setosus* (von Offers, 1816)
   *L. stenopsis* (Burmeister, 1838)
   *L. vituli* (Linnaeus, 1758)

2. *Solenoptes*
   *S. binipilis* (Fahrenholz, 1916)
   *S. capillatus* Enderlein, 1904
   *S. ferrisi* (Fahrenholz, 1916)

D. *Pediculidae*

1. *Microphthalmus*
   *M. microphthalmus* (Ferris, 1916)

2. *Pediculus*
   *P. humanus* Linnaeus, 1758

3. *Phthirus*
   *P. pubis* (Linnaeus, 1758)

II. *Orthoptera*

A. *Blattidae*

1. *Arvatica*
   *A. arctica* Bohm, 1907

2. *Blatta*
   *B. orientalis* (Linnaeus, 1758)

3. *Blattella*
   *B. germanica* (Linnaeus, 1767)

4. *Panchlora*
   *P. nivea* (Linnaeus, 1758)

5. *Pteriplaneta*
   *P. americana* (Linnaeus, 1758)
   *P. australiense* (Fabricius, 1775)

6. *Suppella*
   *S. longipalpa* (Fabricius, 1798)

III. *Coleoptera*

A. *Leptinidae*

1. *Leptinillus*
   *L. validus* (Horn, 1872)

2. *Platypteryx*
   *P. castoris* Ritsema, 1869

B. *Meloidae*

1. *Epicauta*
   *E. fabricii* (LeConte, 1853)
   *E. ferruginea* (Say, 1823)
   *E. normalis* Werner, 1915
   *E. puncticollis* (Mannerheim, 1843)

2. *Lyttus*
   *L. cyanopus* (LeConte, 1851)

3. *Nemognatha*
   *N. furiida* LeConte, 1853
   *N. lutea* LeConte, 1853

IV. *Diptera*

A. *Calliphoridae*

1. *Aldrichina*
   *A. grahami* (Aldrich, 1930)

2. *Bufothelechia*
   *B. silvarum* (Meigen, 1826)

3. *Calliphora*
   *C. coloradensis* Hough, 1899
   *C. fuscata* Hall, 1948
   *C. terraevena* Macquart, 1851
   *C. vicina* Bobineau-Desvoidy, 1830
   *C. comitoria* (Linnaeus, 1758)

4. *Cochliomyia*
   *C. hominivorax* (Coqueral, 1858)
   *C. macellaria* (Fabricius, 1775)

5. *Ctenomyia*
   *C. caducea* (Bobineau-Desvoidy, 1830)

6. *Eucalliphora*
   *E. idaea* (Walker, 1849)

7. *Lucilia*
   *L. illustris* (Meigen, 1826)

8. *Phaechnia*
   *P. sericata* (Meigen, 1826)

9. *Phormia*
   *P. regina* (Meigen, 1826)

10. *Pollenia*
    *P. rudis* (Fabricius, 1794)

11. *Protocalliphora*
    *P. achea* Shannon and Dobroscky, 1924
    *P. aviator* Shannon and Dobroscky, 1924
    *P. cuprina* (Hall, 1948)
    *P. hesperia* Shannon and Dobroscky, 1924
    *P. hirundo* Shannon and Dobroscky, 1924
    *P. hirundo* Shannon and Dobroscky, 1924
    *P. metallica* (Townsend, 1919)
    *P. sialis* Shannon and Dobroscky, 1924
12. Protophormia  
  *P. terranae* (Robineau-Desvoidy, 1830)

B. Ceratopogonidae

1. Culicoides  
  C. baueri Hoffman, 1925  
  C. coxi Leeson and Bland, 1967  
  C. cockerelli (Coquillett, 1901)  
  C. crepuscularis Malloch, 1915  
  C. freemsoni Wirth and Blanton, 1969  
  C. haematopota Malloch, 1915  
  C. hieroglyphicus Malloch, 1915  
  C. montanus Wirth and Blanton, 1969  
  C. obsolatus (Meigen, 1815)  
  C. palmaris James, 1945  
  C. stelleri Wirth, 1952  
  C. achei Leeson, 1946  
  C. varithrips varithrips (Coquillett, 1901)

2. Leptocerops  
  L. kerteszii Heffer, 1908

C. Chloropidae

Hippelates  
  H. microcentrus Coquillett, 1904  
  H. montanus Sabrosky, 1941  
  H. pallipes (Loew, 1865)  
  H. particeps (Becker, 1912)  
  H. pusio Loew, 1872

D. Culicidae

1. Aedes  
  A. atropalpus (Coquillett, 1902)  
  A. campestris Dyar and Knab, 1907  
  A. cataphylla Dyar, 1916  
  A. cinctus Meigen, 1818  
  A. communis (De Geer, 1776)  
  A. darsalis (Meigen, 1830)  
  A. eurycerus (Walker, 1856)  
  A. fitzjii (Felt and Young, 1904)  
  A. flavescens (Walker, 1876)  
  A. hexodontus Dyar, 1916  
  A. impiger (Walker, 1848)  
  A. implicatus Vockeroth, 1954  
  A. incertus Dyar, 1916  
  A. intrudens Dyar, 1919  
  A. melanonius Dyar, 1924  
  A. nielseni O'Meara and Craig, 1970  
  A. nigromaculatus (Ludlow, 1907)  
  A. niphidipus Dyar and Knab, 1918  
  A. pulchatus (Coquillett, 1904)  
  A. schizopinax Dyar, 1929  
  A. sicarius (Ludlow, 1905)  
  A. spenceri vidalensis (Theobald, 1901)  
  A. sticticus (Meigen, 1830)  
  A. trirufus (Coquillett, 1902)  
  A. varipalpus (Coquillett, 1902)  
  A. ventrotus Dyar, 1916  
  A. vexans (Meigen, 1830)

2. Anopheles  
  A. carlei Vargas, 1943  
  A. franciscanus McCracken, 1904  
  A. freemsoni Atken, 1939

3. Coquillettia (syn. Mansonia)  
  C. perturbans (Walker, 1856)

4. Culex  
  C. apiolicus Adams, 1903  
  C. erythrothorax Dyar, 1907

5. Culiseta  
  C. impatiens (Walker, 1848)  
  C. incidunt (Thompson, 1868)  
  C. inornata Williston, 1893  
  C. maritimus dyari Coquillett, 1902  
  C. silvestris minnesotae Barr, 1957

6. Orthopodomyiidae  
  O. signicola (Coquillett, 1889)

7. Psorophora  
  P. signicola (Coquillett, 1896)

E. Cuterebridae  

Cuterebra  
  C. angustibranchus Dalmat, 1942  
  C. approximata Walker, 1866  
  C. grisea Coquillett, 1904  
  C. jellisoni Curran, 1942  
  C. lepusculi Townsend, 1897  
  C. polia Coquillett, 1898  
  C. princeps (Austen, 1895)  
  C. ruficrus (Austen, 1933)  
  C. tenebriosa Coquillett, 1898

F. Gasterophilidae  

Gasterophilus  
  G. haemorrhoidalis (Linnaeus, 1758)  
  G. intestinalis (De Geer, 1776)  
  G. nasalis (Linnaeus, 1758)

G. Hippobosidae

1. Icista  
  I. americana (Leach, 1817)  
  I. hissata (Ferris, 1927)  
  I. nigra (Perty, 1833)

2. Lipoptena  
  L. depressa (Say, 1823)

3. Melophagus  
  M. ovinus (Linnaeus, 1758)

4. Mygophthiria  
  M. fimbriatu (Waterhouse, 1887)

5. Neolipoptena  
  N. ferrisi (Bequaert, 1935)

6. Olfersia  
  O. sordida Bigot, 1885

7. Ornithomyia  
  O. anchiceria Speiser, 1905

8. Ornithoica  
  O. ricina (Walker, 1849)

H. Muscidae

1. Fannia  
  F. canicularis (Linnaeus, 1761)  
  F. scalaris (Fabricius, 1794)

2. Haematobia  
  H. irritans Linnaeus, 1758

3. Musca  
  M. autumnalis De Geer, 1776  
  M. domestica (Linnaeus, 1758)
4. Muscina
   M. assimilis (Fallén, 1823)
   M. stabulans (Fallén, 1817)

5. Stomoxys
   S. calcitrans (Linnaeus, 1758)

1. Nycteribiidae
   Basilia
      B. aurozoi (Townsend, 1893)
      B. corynorhini (Ferris, 1916)
      B. forcipata Ferris, 1924

2. Oestrini
   C. fuscipes (Townsend, 1894)
   C. pratti Hunter, 1916

2. Hypoderina
   H. hovis (Linnaeus, 1758)
   H. lineatum (Villers, 1789)

3. Oestrus
   O. ovis Linnaeus, 1758

K. Piophilidae
   Piophilus
      P. caci (Linnaeus, 1758)

L. Psychodidae
   1. Latzomyia
      L. aquilosa (Fairchild and Harwood, 1961)
      L. californica (Fairchild and Hertig, 1957)
      L. ophidiani (Dampf, 1944)
      L. stewarti (Mangabeira and Calundo, 1944)
      L. vexator (Coquillett, 1907)

2. Psychoda
   P. alternata Say, 1824

M. Rhagionidae
   Symphoromyia
      S. atripes Bigot, 1887
      S. fuliceps Bigot, 1887
      S. hirta Johnson, 1897
      S. inquisitor Aldrich, 1915
      S. johnsoni Coquillett, 1894
      S. pachyceras Williston, 1886

N. Sarcophagidae
   1. Rutina
      R. acerba (Walker, 1849)
      R. dercticola (Walker, 1852)
      R. crabunda (Wulp, 1895)
      R. latistecosa Parker, 1914
      R. thermophilica (Robineau-Desvoidy, 1830)
      R. planifrons (Aldrich, 1916)
      R. pusilis (Wulp, 1895)

2. Sarcophaga
   S. argyrotona (Robineau-Desvoidy, 1830)
   S. bishopp Aldrich, 1916
   S. bullata Parker, 1916
   S. cooleyi Parker, 1914
   S. macrorhoidalis (Fallén, 1817)
   S. perspicax, Aldrich, 1916
   S. sarcocnida Aldrich, 1916
   S. shermani Parker, 1923
   S. sinuata Meigen, 1826
   S. utilis Aldrich, 1915

3. Wohlfahrtia
   W. vigil opaca Coquillett, 1897

O. Simuliidae
   1. Culephia
      C. jeaneae DeFoliart and Peterson, 1960
      C. mutata (Malloch, 1914)
      C. ciliata DeFoliart and Peterson, 1960

   2. Prosimulium
      P. dawicisi Peterson and DeFoliart, 1960
      P. exigens Dyar and Shannon, 1927
      P. flavicentrum (Stains and Knowlton, 1940)
      P. fulvum (Coquillett, 1902)
      P. longipalpis Peterson and DeFoliart, 1960
      P. oyacephalum Dyar and Shannon, 1927
      P. showelli Peterson and DeFoliart, 1960
      P. travisi Stone, 1952
      P. wintnera Peterson and DeFoliart, 1960
      P. unicum (Twinn, 1938)

3. Simulium
   S. arcticum Malloch, 1914
   S. berglani Williston, 1893
   S. aurenca Fries, 1824
   S. bicorne Dorogostajski, Bubtazov, and Vaseiko, 1935
   S. bivittatum Malloch, 1914
   S. canadense Heale, 1932
   S. canonicola (Dyar and Shannon, 1927)
   S. cortis Twinn, 1936
   S. decorum Walker, 1848
   S. dejoliarti Stone and Peterson, 1958
   S. griseum Coquillett, 1898
   S. hunteri Malloch, 1914
   S. jaemubi Dyar and Shannon, 1927
   S. latipes (Meigen, 1804)
   S. mediterraneum Knab, 1915
   S. meridionale Riley, 1887
   S. nigricoxum Stone, 1952
   S. petersen Stone and DeFoliart, 1959
   S. piperae Dyar and Shannon, 1927
   S. pugetense (Dyar and Shannon, 1927)
   S. rugglesi Nicholson and Mickel, 1950
   S. triquattatum Malloch, 1914
   S. tuberosum (Landstrom, 1911)
   S. venator Dyar and Shannon, 1927
   S. venustum Say, 1823
   S. virgatum Coquillett, 1902
   S. vittatum Zetterstedt, 1838
   S. wyomingense Stone and DeFoliart, 1959

4. Twinnia
   T. nova (Dyar and Shannon, 1927)

P. Streblidae
   Trichobius
      T. corynorhini Cockerell, 1910
      T. major Coquillett, 1899

Q. Syrphidae
   Eristalis
      E. dimidiatas Wiedemann, 1830
      E. tenax (Linnaeus, 1758)

R. Tabanidae
   1. Atlylotus
      A. incisuralis var. uthenis Row and Knowlton, 1935

   2. Chrysops
      C. aetnans Wulp, 1867
      C. calidus Osten Sacken, 1875
3. Haematopota
   H. americana Osten Sacken, 1875
4. Hybonitida
   H. epistates (Osten Sacken, 1878)
   H. frontalis (Walker, 1848)
   H. opaca (Coquillett, 1904)
   H. rhombica (Osten Sacken, 1876)
   H. rhombica var. osburni (Hine, 1904)
   H. raepstris (McDonough, 1921)
   H. sequax (Williston, 1887)
   H. sonoranus var. phaeonops (Osten Sacken, 1877)
   H. tetrica var. hirtula (Bigot, 1892)
5. Pilinus
   P. californicus (Bigot, 1892)
6. Siltrius
   S. quadrirritatus (Say, 1823)
7. Stenotabanus
   S. flavidus (Hine, 1904)
   S. guttatus (Townsend, 1893)
8. Tabanus
   T. aequalis Osten Sacken, 1877
   T. atratus Fabricius, 1775
   T. dorsalis Walker, 1860
   T. gilanus Townsend, 1897
   T. laticeps Hine, 1904
   T. lincola Fabricius, 1794
   T. productus Hine, 1904
   T. punitus Macquart, 1838
   T. punctifer Osten Sacken, 1876
   T. stoechi Philip, 1941

V. Hemiptera
A. Cimicidae
1. Cimex
   C. lectularius Linnaeus, 1758
   C. pilosellus (Horvath, 1910)
2. Oeciacus
   O. vicarius Horvath, 1912
B. Reduviidae
1. Reduvius
   R. personatus (Linnaeus, 1758)
   R. vандuzeci Wygodzinsky and Usinger, 1964
2. Triatomina
   T. protracta (Uhler, 1894)

VI. Hymenoptera
A. Apidae
1. Apis
   A. mellifera Linnaeus, 1758
2. Bombus
   B. appositus Cresson, 1878
   B. bifarius Cresson, 1878
   B. centralis Cresson, 1864
   B. edwardsii Cresson, 1878
   B. flavifrons Cresson, 1863
   B. griseocollis (De Geer, 1773)
   B. hanti Greene, 1860
   B. morsitans Cresson, 1878
   B. nevadensis nevadensis Cresson, 1874
   B. occidentalis occidentalis Greene, 1838
   B. rufocinctus Cresson, 1863

B. Formicidae
1. Pogonomymex
   P. barbatus barbatus (F. Smith, 1856)
   P. californicus (Buckley, 1867)
   P. imberbiculus W.M. Wheeler, 1902
   P. occidentalis (Cresson, 1865)
   P. rugosus Emery, 1895
2. Crematogaster
   C. mormonum Emery, 1895
   C. vermiculata Emery, 1895
3. Solenopsis
   S. molesta molesta (Say, 1836)
   S. molesta californica Emery, 1895
   S. salina W.M. Wheeler, 1908
   S. xyloni McCook, 1879

C. Mutillidae
1. Chryphotes
   C. pedaphus Buzicky, 1941
   C. similis Baker, 1905
2. Dasynataclla
   D. californica (Radoszkowski, 1861)
   D. canco (Blake, 1879)
   D. fulvohirta (Cresson, 1865)
   D. gloriosa (Saussure, 1867)
   D. klugii (Gary, 1872)
   D. monticola (Cresson, 1865)
   D. phaon phaon (Fox, 1899)
   D. phaon var. fimbrialis Mickel, 1928
   D. scita Mickel, 1928
   D. urada (Cresson, 1875)
   D. vesta vesta Cresson, 1865
3. Dilophotopsis
   D. concolor concolor (Cresson, 1865)
4. Odontophotopsis
   O. crebus (Melander, 1903)
   O. inconsistens (Blake, 1886)
   O. melicana (Blake, 1871)
   O. venusta (Blake, 1886)
5. Pseudomethoca
   P. contamx (Cresson, 1865)
   P. contamculosa Mickel, 1935
   P. manca Mickel, 1924
   P. prepuqcia (Cresson, 1865)
   P. toumeyi (Fox, 1894)
6. Sphacrophalma
   S. abdominals (Blaker, 1886)
   S. ceres (Fox, 1899)
   S. dirc (Fox, 1899)
   S. marpesia (Blake, 1879)
   S. unicola (Cresson, 1865)
7. Timula
   T. groei (Blake, 1871)
8. Typhoeotes  
   *T. peculiaris* (Cresson, 1875)

D. Pompilidae

*Pepis*

- *P. angustimarginata* Viereck, 1908
- *P. mildiei* Stol., 1857
- *P. pallidolimbata* pallidolimbata *Lucas*, 1895
- *P. thuse* *Lucas*, 1895

E. Sphecidae

1. Astata
   - *A. bicolar* Say, 1823
   - *A. novadica* Cresson, 1881
   - *A. nubecula* Cresson, 1865
   - *A. occidentalis* Cresson, 1881

2. Bembix
   - *B. americana comata* Parker, 1917
   - *B. americana spinolae* Lepeletier, 1845
   - *B. antoica* Handlirsch, 1893
   - *B. occidentalis W.J. Fox*, 1893
   - *B. rugosa* Parker, 1917

3. Cercomis
   - *C. confrians* Mickel, 1916
   - *C. contergens* Viereck and Cockerell, 1904
   - *C. finitima* Cresson, 1865
   - *C. nigrescens Smith*, 1856

4. Clypeadon
   - *C. laticinctus* (Cresson, 1865)

5. Didineis
   - *D. nodosa* Fox, 1894

6. Mimesa
   - *M. cressonii* Packard, 1867

7. Philanthus
   - *P. gibbosus* (Fabricius, 1775)

8. Priolyz
   - *P. atratus* (Lepeletier, 1845)
   - *P. parkeri* Bohart and Menke, 1963

F. Vespidae

1. Ancistrocerus
   - *A. antilope antilope* (Panzer, 1798)
   - *A. catkills albolateralus* (Saussure, 1855)
   - *A. catkills* *Saussure*, 1853
   - *A. lineaticinctus fulicarpus* Cameron, 1908
   - *A. neocallosus* *Neocallosus* *Bequaert*, 1943
   - *A. spilogaster* Cameron, 1905
   - *A. tigris tigris* (Saussure, 1857)
   - *A. tuberculiceps sutterianus* (Saussure, 1875)
   - *A. tuberculiceps tuberculiceps* (Saussure, 1853)

2. Euodynerus
   - *E. annulatus annulatus* (Say, 1824)
   - *E. annulatus sulphureus* (Saussure, 1858)
   - *E. auratus* (Cameron, 1906)
   - *E. boscoi boscoi* (Lepeletier, 1841)
   - *E. exoglyphus alborigratus* (R. Bohart, 1939)
   - *E. exoglyphus exoglyphus* (R. Bohart, 1939)
   - *E. foraminatus acquisum* (Cameron, 1906)
   - *E. fusus fusus* (Cresson, 1872)
   - *E. hidalgio hidalgio* (Saussure, 1857)
   - *E. martini* (R. Bohart, 1942)
   - *E. praeclam praeclam* (Saussure, 1870)
   - *E. russatus* (R. Bohart, 1942)

3. Eumenes
   - *E. bollii bollii* Cresson, 1872

   - *E. ituride pedalis* Fox, 1894
   - *E. scullenii R. Bohart*, 1950
   - *E. verticalis tricinctus* Isely, 1917

4. Leptochilus
   - *L. craspedus* (R. Bohart, 1940)
   - *L. repubicanus* (Dalta Torre, 1889)
   - *L. rubicundulus* (R. Bohart, 1940)
   - *L. rufinodus* (Cresson, 1868)

5. Mischocyttarus
   - *M. flavitarsis flavitarsis* (Saussure, 1854)
   - *M. flavitarsis dalhoensis* *Bequaert*, 1933

6. Odopyrus
   - *O. cinnabarinus* R. Bohart, 1939
   - *O. margaritellus* Rohwer, 1915

7. Polistes
   - *P. canadensis var. kaibabensis* Hayward, 1932
   - *P. flavus* Cresson, 1868
   - *P. fuscioculata* centralis Hayward, 1933
   - *P. fuscioculata tuberculata* Hayward, 1933

8. Pseudomasarus
   - *P. edwardsii* (Cresson, 1872)
   - *P. zonalis* (Cresson, 1864)

9. Pterochilus
   - *P. laticeps* Cresson, 1872
   - *P. micheneri* R. Bohart, 1940
   - *P. pedicellatus* R. Bohart, 1940
   - *P. provancheri* (Huard, 1895)

10. Stenodynerus
    - *S. apache* R. Bohart, 1949
    - *S. blandoides blandoides* R. Bohart, 1943
    - *S. blandus blandus* (Saussure, 1870)
    - *S. cockscennis* (Viereck, 1908)
    - *S. minimoferus* R. Bohart, 1949
    - *S. niticulis niticulis* *Bequaert*, 1948
    - *S. percipianus* (Viereck, 1906)
    - *S. tolches* (Saussure, 1857)
    - *S. valliculus* R. Bohart, 1948

11. Symmorphus
    - *S. meridionalis* (Viereck, 1903)

12. Vespuca
    - *V. artica* Rohwer, 1916
    - *V. arenaria* (Fabricius, 1775)
    - *V. atropilosa* Sladen, 1918
    - *V. austriaca* (Panzer, 1799)
    - *V. consobrina* (Saussure, 1864)
    - *V. maculata* (Linnæus, 1763)
    - *V. norwegica* Sladen, 1918
    - *V. pennsylvanica* (Saussure, 1857)
    - *V. vulgaris* (Linnæus, 1758)

VII. Lepidoptera

A. Arctiidae

1. Arachnis
   - *A. picta* Packard, 1864

2. Arctia
   - *A. cauca utahensis* (Henry Edwards, 1886)

3. Aphantopus
   - *A. nevadensis* (Grote and Robinson, 1866)
   - *A. ornata* (Packard, 1864)
   - *A. parthenice* (Kirby, 1837)
   - *A. proxima* (Guérin-Meneville, 1844)
A. williamsi toove Barnes and McDunnough, 1910
A. williamsi form determinata (Neumoegen, 1881)

4. Diacrisia
D. vagans (Boisduval, 1852)
D. virginita (Fabricius, 1798)

5. Ectypia
E. elio Jessica (Barnes, 1900)

6. Estigmene
E. orceousis (Stretch, 1873)

7. Halysidota
H. argentata subsalpina French, 1890
H. maculata agassizi Packard, 1864
H. osata Rothschild, 1909
H. tessellaris (J. E. Smith and Abbott, 1797)

8. Hemihyalea
H. labecula (Grote, 1881)

9. Holometbina
H. fragilis (Strecker, 1878)

10. Isia
I. isabella (J. E. Smith and Abbott, 1797)

11. Leptarcia
L. californiae form decia (Boisduval, 1869)

12. Neumcephala
N. plantaginis (Linnaeus, 1758)

B. Lasiocampidae
1. Malacosoma
M. americanum (Fabricius, 1793)
M. californicum fragile (Stretch, 1881)
M. distria Hubner, 1822

2. Phylloesta
P. americana (Harris, 1841)

3. Tolype
T. glenwoodi Barnes, 1900

C. Lymantriidae
Dasychira
D. vagans grisa (Barnes and McDunnough, 1913)

D. Nymphalidae
1. Aglais
A. milberti Godart, 1819

2. Argynnis
A. leto Behr, 1862
A. nokomis Edwards, 1862

3. Basilia
B. korgutia Boisduval, 1852

4. Nymphalis
N. antiopa (Linnaeus, 1758)

5. Vanessa
V. atalanta Linnaeus, 1758
V. cardui Linnaeus, 1758
V. cardi Hubner, 1806

E. Saturniidae
1. Automeris
A. io (Fabricius, 1775)

2. Coloradia
C. pandora Blake, 1863

3. Hemileuca
H. eleganterina (Boisduval, 1852)
H. hera hera (Harris, 1841)
H. meadealis Stretch, 1872
H. obtua Cockerell, 1898

4. Platysamia
P. curyalus (Boisduval, 1855)
P. tecferi Strecker, 1872

VIII. Mallophaga
A. Gyropidae
Clinicola
G. porcelli (Schank, 1781)
G. ovais Burmeister, 1838

B. Laemobothriidae
Laemobothrus
L. atrum (Nitzsch, 1818)
L. glutinans Nitzsch, 1861
L. maximum (Scopoli, 1763)
L. similis Kellogg, 1896
L. tinnunculi (Linnaeus, 1758)
L. vartius (J. C. Fabricius, 1775)

C. Menoponidae
1. Actornithophilus
A. lacustris Clay, 1962
A. lusarius Clay, 1962
A. luminosae (Kellogg, 1908)
A. mexicanus Emerson, 1953
A. ochraceus (Kellogg, 1818)
A. paludosus Clay, 1962
A. patellatus (Piaget, 1890)
A. picus lari (Packard, 1870)
A. picus picus (Denny, 1842)
A. stipit (Kellogg & Paine, 1911)
A. tosani (Schrank, 1803)
A. umbrius (Burnmeister, 1838)
A. uniseriatum (Piaget, 1880)

2. Amyrisidae
A. megalosoma (Overgaard, 1943)
A. perdicis (Denny, 1842)

3. Ardeipilus
A. floridus Tuff, 1965

4. Austromenapone
A. aegialitidis (Durrant, 1906)
A. atrufefulum (Piaget, 1880)
A. duriacetus (Blagoyevshchensky, 1948)
A. himantopi Timmermann, 1954
A. limosae Timmermann, 1954
A. mierandum (Nitzsch, 1866)
A. suchlebenci Timmermann, 1954
A. speciere Timmermann, 1956
A. squararoac Timmermann, 1954
A. transversa (Denny, 1842)

5. Bononiella
B. colubrace Emerson, 1957

6. Ciceniphilus
C. butoriophilus Carriker, 1964
C. cufi Price & Beer, 1965
C. decimfasciatus (Boisduval & Lacerdale, 1835)
C. pectintunentric (Harrison, 1916)

7. Calpocephalum
C. brachyosomum Kellogg & Chapman, 1902
C. flavescens (de Haan, 1829)
C. fregilii Denny, 1842
C. impressum Rudow, 1866
C. kelloggi Osborn, 1902
C. leptoptygos Nitzsch, 1874
C. nanum Piaget, 1890
C. napiforme Rudow, 1869
C. pectinatum Osborn, 1902
C. tarsi (Ansari, 1951)
C. turbinatum Denny, 1842
C. unciferum Kellogg, 1896
C. zebrae Ansari, 1955
8. Comatumenopon
C. thulae Tuff, 1967
9. Cuculiphilus
C. alternatus (Osborn, 1902)
10. Dennyus
D. bruneri (Carriker, 1903)
D. spiniger Ewing, 1930
11. Eureum
E. spenceri Emerson & Pratt, 1956
12. Hohoristicca
H. frontalis Carriker, 1949
13. Holomenopon
H. elypheilargum Eichler, 1943
H. leucoxanthum (Burmeister, 1838)
H. setigerum (Blagoveshchensky, 1948)
H. transvaalense (Bedford, 1920)
14. Kurodaia
K. acalidae Price & Beer, 1963
K. flaminei Price & Beer, 1963
K. fulvovasciata (Piaget, 1880)
K. haliueti (Denny, 1842)
K. magna Emerson, 1960
K. painci (McGregor, 1912)
K. subpachygaster (Piaget, 1880)
15. Machaciracidus
M. americanus (Ewing, 1930)
M. clayae (Balat, 1966)
M. malleus (Burmeister, 1838)
M. melospicata Emerson, 1954
16. Menacanthus
M. alaskensis (Kellogg & Chapman, 1902)
M. annulatus (Giebel, 1874)
M. chrysocephalus (Kellogg, 1896)
M. distinctus (Kellogg & Chapman, 1899)
M. eurysternum (Burmeister, 1838)
M. expansus (Osborn, 1896)
M. gonophagus (Burmeister, 1838)
M. mutabilis Blagoveshchensky, 1940
M. perforatus (Piaget, 1880)
M. persignatus (Kellogg & Chapman, 1899)
M. picicola (Packard, 1873)
M. robustus (Kellogg, 1896)
M. stramineus (Nitzsch, 1818)
17. Menopon
M. pallens Clay, 1949
18. Myrsidea
M. anaspila (Nitzsch, 1866)
M. conspica (Kellogg & Chapman, 1902)
M. euculilaris (Nitzsch, 1818)
M. disciformis (Kellogg, 1896)
M. emersoni Clay, 1966
M. incripta (Kellogg, 1896)
M. interrupta (Osborn, 1896)
M. latifrons (Carriker, 1910)
M. melanorum (Kellogg, 1896)
M. palloris (Carriker, 1903)
M. picae (Linnaeus, 1758)
M. quadrifuscata (Halget, 1880)
M. quadrimacula (Carriker, 1902)
M. ridulosa (Kellogg & Chapman, 1899)
M. rustica (Giebel, 1874)
19. Nosopon
N. lucidum (Rudow 1869)
20. Piagetia
P. pectoris (Leidy, 1878)
21. Plegadiphius
P. plegadis (Dubinin, 1938)
22. Pseudomenopon
P. insolens (Kellogg, 1896)
P. par (Kellogg, 1896)
P. pilosum (Scopoli, 1763)
P. quadrii Eichler, 1952
23. Triniton
T. anserinum (J. C. Fabricius, 1805)
T. quercusculae (Linnaeus, 1758)
D. Philopteridae
1. Acidoproctus
A. maximus Piaget, 1878
2. Anaticola
A. crassicornis cornicoides (Zavaleta, 1946)
A. crassicornis crassicornis (Scopoli, 1763)
A. crassicornis dactyliscus Carriker, 1956
A. crassicornis depuratus (Nitzsch, 1866)
A. crassicornis hopkinsii Eichler, 1954
A. crassicornis mergiserrati (De Geer, 1778)
3. Anatococus
A. cygni emersoni Keler, 1960
A. dentatus affinis Keler, 1960
A. dentatus dentatus (Scopoli, 1763)
A. dentatus ferruginus (Giebel, 1874)
A. ictirodes bipunctatus (Giebel, 1874)
A. ictirodes boschadis Keler, 1960
A. ictirodes ictirodes (Nitzsch, 1818)
A. ictirodes marci Keler, 1960
A. ictirodes simillimus Keler, 1960
A. ictirodes tendeiroi Keler, 1960
4. Aquanirimus
A. americanus (Kellogg & Chapman, 1899)
5. Ardeicola
A. botauri (Osborn, 1896)
A. crussula Carriker, 1960
A. expallida Blagoveshchensky, 1940
A. florida nigra Tuff, 1967
A. goisagi Uchida, 1953
A. rhapidus (Nitzsch, 1866)
6. Brucelia
B. angustifrons (Carriker, 1902)
B. argula (Burmeister, 1838)
B. audax (Kellogg, 1899)
B. biocellata (Piaget, 1880)
B. branchyhorax (Giebel, 1874)
B. cedrorum (Piaget, 1880)
B. deficiens (Piaget, 1885)
B. domestica (Kellogg & Chapman, 1899)
B. dactyli (Kellogg & Chapman, 1899)
B. illiaci brevicolor Ansari, 1956
B. interposita (Kellogg, 1899)
B. limbata (Burmeister, 1838)
B. longa (Kellogg, 1896)
B. longifrons Carriker, 1956
B. nebulosa (Burmeister, 1838)
B. ornatissima (Giebel, 1874)
B. peninsularis (Kellogg, 1899)
B. rotundata (Osborn, 1896)
B. straminea (Denny, 1842)
B. subtillis (Nitzsch, 1874)
B. tenuis (Burmeister, 1838)
B. sanxothephal (Osborn, 1896)
B. zeropunctata antiqua Ansari, 1956
B. zeropunctata zeropunctata Ansari, 1957
7. Carduiceps
C. cingulatus cingulatus (Denny, 1842)
C. cingulatus clayae Timmermann, 1954
C. zonarius (Nitzsch, 1866)
8. Chelopistes
C. meleagridis (Linnaeus, 1758)
9. Citropalathrus
C. testudinarius (Children, 1836)
10. Colinaciola
C. docophoroides (Piaget, 1880)
11. Columbicola
C. baculoides Payne, 1912
C. macrorae (Wilson, 1941)
12. Crespedoryrhycthus
C. americanaus Emerson, 1960
C. aquisinus (Denny, 1842)
C. dilatatus (Rudow, 1869)
C. hacomatus (Scopoli, 1763)
C. hirutus Carriker, 1956
C. subhacematus Emerson, 1960
13. Cuculagaster
C. heterogrammicus (Nitzsch, 1866)
14. Cuculicola
C. splendidus (Kellogg, 1899)
15. Cuculoces
C. cocygi (Osborn, 1895)
16. Cummingiella
C. ambigua (Burmeister, 1838)
C. longirrostra (Wilson, 1937)
17. Deguetrella
D. discocephalus aquaticum Eichler, 1943
D. fulva (Giebel, 1874)
D. fusca (Denny, 1842)
D. nixa nixa (Giebel, 1866)
D. nixus vagus (Giebel, 1874)
D. regalis (Giebel, 1866)
D. rufa carruthi Emerson, 1953
D. rufa rufa (Burmeister, 1838)
18. Falcoliprurus
F. marginalis Osborn, 1902
F. sutiliss (Rudow, 1869)
19. Fulicorputa
F. anercrita Emerson, 1960
F. comstocki (Kellogg & Paine, 1911)
F. distincta Emerson, 1960
F. longipila (Kellogg, 1896)
20. Goniconotes
G. chrysopcephalus Giebel, 1874
G. microthorax (Stephans, 1829)
21. Gonioces
G. bonitus Emerson, 1948
G. centrocerci Simon, 1938
G. cophici Denny, 1842
G. dispar Burmeister, 1838
G. merriamanius Packard, 1873
G. nebraskensis Carriker, 1945
G. stefani Clay & Hopkins, 1955
G. submammatus Emerson, 1950
22. Hidioceus
I. bisciallyts (Nitzsch, 1866)
23. Incidifrons
I. monachus (Kellogg & Paine, 1911)
I. transpositus (Kellogg, 1896)
24. Lagopocaec
L. colchicus Emerson, 1949
L. gandelti Emerson, 1949
L. gibsoni Hopkins, 1947
L. obscurus Emerson, 1948
L. perplexus (Kellogg & Chapman, 1899)
L. umbellus Emerson, 1950
25. Lipurus
L. maculosus Clay, 1938
26. Lunaceps
L. holophaeus cabenisi Timmermann, 1954
L. linoarela chyac Timmermann, 1954
L. numenii (Denny, 1842)
27. Multicola
M. macrocephalus (Kellogg, 1896)
28. Ornithobius
O. gonipleurus Denny, 1842
O. waterstoni reconditus Timmermann, 1962
29. Oxylipurus
O. corpulentus Clay, 1938
O. ellipticus (Keler, 1958)
O. mesopekus colchicus Clay, 1938
O. polytrapezius (Burmeister, 1838)
30. Pectinopagus
P. faralloni (Kellogg, 1896)
P. toloffi, Elbel & Emerson, 1956
31. Penecirnus
P. arcticus Cariker, 1958
P. auritus (Scopoli, 1763)
P. gulosus (Nitzsch, 1866)
P. jungens (Kellogg, 1896)
P. mirinotatus (Kellogg & Chapman, 1899)
P. quadripristatus (Kellogg & Mann, 1912)
32. Philopterus
P. angellii (Osborn, 1896)
P. americanaus (Kellogg, 1899)
P. citrinellae curvirostrae (Schrank, 1776)
P. corvi (Linnaeus, 1758)
P. excisus domesticius (Kellogg, 1896)
P. excisus major (Kellogg, 1896)
P. excisus microsomaticus Tandam, 1955
P. fringilla (Scopoli, 1772)
P. Garrilac (Piaget, 1880)
P. hannahi Balc, 1955
P. mirius (Kellogg & Chapman, 1899)
P. ocellatus osborni Edwards, 1952
P. philipii Emerson, 1953
P. piecer (Denny, 1842)
P. rufus (Kellogg, 1899)
P. rutteri (Kellogg, 1899)
33. Physconeloides
P. spencerii Emerson & Ward, 1958
P. wisemanii Emerson, 1960
P. zeilandrae (McGregor, 1917)
34. Picicola
P. foedus (Kellogg & Chapman, 1899)
P. orpheus (Osborn, 1896)
P. snodgrassi (Kellogg, 1896)

35. Quadraecops
Q. alycoides (Carriker, 1959)
Q. assimilis major (Kellogg, 1899)
Q. carrikeri Hopkins & Timmermann, 1954
Q. connexus (Kellogg & Mann, 1912)
Q. charadrii hostis (Nitzsch, 1866)
Q. falcigerus (Peters, 1931)
Q. fimbriatus (Giebel, 1866)
Q. gricus (Rudow, 1899)
Q. hemichirus (Nitzsch, 1866)
Q. hiaticulac boophilus (Kellogg, 1896)
Q. nigrobrachatus (Mjöberg, 1910)
Q. phaeoconus (Nitzsch, 1866)
Q. punctatus sublingulatus Timmerman, 1952
Q. ratus (Kellogg, 1899)
Q. scipiosus mexicanus Carriker, 1944
Q. similis (Giebel, 1866)
Q. zephyrus (Timmermann, 1954)

36. Rallicola
R. acinus (Kellogg, 1896)
R. kelloggi Emerson, 1957
R. mystax (Giebel, 1874)
R. ortygonotus subporzcmac Emerson, 1957

37. Rhynoanotus
R. scolopacis (Denny, 1842)

38. Rotundiceps
R. cordatus (Osborn, 1896)

39. Saemundessonia
S. conica conica (Denny, 1842)
S. conica hauanae (Giebel, 1874)
S. kratochvili Balat, 1950
S. lari congest (Giebel, 1874)
S. lobaticeps (Giebel, 1874)
S. parvigenitalis Ward, 1955
S. platygastrat nigritic (Giebel, 1866)
S. platygastrat platygastr (Denny, 1842)
S. scolopacispachepodiis (Schrank, 1803)
S. tricolor Carriker, 1956
S. tringae (O. Fabricius, 1780)

40. Strigipilus
S. acutifrons Emerson, 1961
S. aitkeni Clay. 1966
S. barbatis (Osborn, 1902)
S. curata (Burmeister, 1858)
S. cuneatus (Rudow, 1870)
S. otus Emerson, 1955
S. spicata (Osborn, 1896)

41. Sturmiodocus
S. simplex (Kellogg, 1896)
S. sturni (Schrank, 1776)

E. Ricinidae

1. Ricinus
R. angulatus (Kellogg, 1896)
R. arcanthus (Kellogg & Mann, 1912)
R. bombylicola (Denny, 1842)
R. diffusus (Kellogg, 1896)
R. incertiatus Balat, 1966
R. japonicus (Uchida, 1915)
R. medius Uchida, 1926
R. merulaca (Durrant, 1906)
R. microcephalus (Kellogg, 1896)

R. picturatus (Carriker, 1902)
R. subfusus (Durrant, 1906)
R. succinicus (Kellogg, 1896)
R. serratus (Durrant, 1906)

2. Trochiocetes
T. lineatus (Osborn, 1896)
T. promineus (Kellogg & Chapman, 1899)
T. ochoterenai (Zavalia, 1943)

F. Trichodectidae

1. Bovicola
B. bovis (Linnaeus, 1758)
B. caprae (Gurtl, 1843)
B. crassipes (Rudow, 1866)
B. equi (Denny, 1842)
B. limbatus (Cervais, 1844)
B. ovis (Schrank, 1781)

2. Etrichophilus
E. etreichophilus (Giebel, 1861)

3. Felicola
F. subrostrata (Burmeister, 1838)

4. Geomyophilus
G. californicus (Chapman, 1897)

5. Neotrichodectes
N. osborni Keler, 1944

IX. Siphonaptera

A. Amphipitylidae
Amphipitylum
A. sibirica washingtoni Hubbard, 1954

B. Ceratophylidae

1. Amphitus
A. necopinus (Jordan, 1925)

2. Ceratophyllum
C. affinis neglectus Smirn, 1958
C. celsus celsus Jordan, 1926
C. gareti Rothschild, 1902
C. niger C. Fox, 1908
C. petrochilidoni Wagner, 1936

3. Dactylopitylum
D. (Foxella) ignota apachina (C. Fox, 1941)
D. (Foxella) ignota arizonensis (Hubbard, 1947)
D. (Foxella) ignota conis Jordan, 1929
D. (Foxella) ignota ignota Baker, 1895
D. (Foxella) ignota rceula (Jordan and Rothschild, 1915)
D. (Foxella) ignota utahensis (Wagner, 1931)
D. (Foxelloides) minidoka Prince and Stark, 1951
D. (Spicata) rara 1. Fox, 1940

4. Diubanus
D. montanus (Baker, 1895)

5. Malaracous
M. bitterrootensis (Dunn, 1923)
M. euphorbi (Rotthait, 1906)
M. sinonis (Jordan, 1925)
M. telephoton (Rotthait, 1905)
M. confinantis Prince, 1959

6. Megabothris
M. abantis (Rotthait, 1906)

7. Monopitylus
M. ciliatus kincaidi Hubbard, 1947
M. cyrturus (Jordan, 1929)
M. cumolpi americanae Hubbard, 1950
M. cumolpi cumolpi (Rothschild, 1905)
M. exilis (Jordan, 1937)
M. vison (Baker, 1904)
M. wagneri (Baker, 1904)

8. Nosopsyllus
   N. fasciatus (Bosc d’Antic, 1801)

9. Opisocera
   O. hirsutissima (Baker, 1895)
   O. labris (Jordan and Rothschild, 1922)
   O. tuberculatus cyanomuris Jellison, 1939
   O. tuberculatus tuberculatus (Baker, 1904)

10. Opisodasys
    O. kevini kevini (Baker, 1896)
    O. pseudarchomys (Baker, 1904)

11. Orychacaps
    O. caudens caudens (Jordan, 1925)
    O. howardi (Baker, 1895)
    O. leucopus (Baker, 1904)
    O. neotomae Auguston, 1943
    O. nepos (Rothschild, 1905)
    O. sexdentatus agilis (Rothschild, 1905)
    O. sexdentatus nevaldensis (Jordan, 1929)

12. Oropsylla
    O. idahoensis (Baker, 1904)

13. Thrassis
    T. acamantis meadius Stark, 1970
    T. acamantis utahensis (Wagner, 1936)
    T. aridis capistris Prince, 1944
    T. aridis hoffmani (Hubbard, 1949)
    T. arizonensis (Baker, 1898)
    T. bacchi bacchi (Rothschild, 1905)
    T. bacchi caduca (Jordan, 1930)
    T. bacchi consimilis Stark, 1957
    T. bacchi gladiolus (Jordan, 1925)
    T. francisi barnesi (Stark, 1970)
    T. francisi francisi (C. Fox, 1927)
    T. pandora pandora Jellison, 1937
    T. stanfordi (Wagner, 1936)

C. Hystrichopsyllidae

1. Anomopsyllus
   A. amphibolus Wagner, 1936
   A. nudatus (Baker, 1898)

2. Atrophiloceras
   A. cebis cebis Jordan and Rothschild, 1915
   A. multidentatus multidentatus (C. Fox, 1909)

3. Callistopsyllus
   C. taurus (Rothschild, 1905)

4. Catallagia
   C. decipiens Rothschild, 1915
   C. newcys Holland and Loshbaugh, 1958

5. Carteretta
   C. carteri clarata Good, 1942

6. Conorhinopsylla
   C. stanfordi Stewart, 1930

7. Corrodopsylla
   C. curvata curvata (Rothschild, 1915)
   C. curvata obtusata (Wagner, 1929)

8. Ctenophilothamnus
   C. pseudagyrtis pseudagyrtis (Baker, 1904)

B. Leptosyllidae

1. Ctenopsylla
   C. armatus terribilis (Rothschild, 1903)

2. Odontopsyllus
   O. dentatus (Baker, 1904)

3. Ornithopsylla
   O. nevadens Holland and Loshbaugh, 1958

4. Peromyscopsylla
   P. hamifer ivigans (Jordan, 1937)
   P. hesperomys adelpha (Rothschild, 1915)
   P. hesperomys rafaelensis (Dunn, 1923)
   P. selenis (Rothschild, 1906)

F. Pulicidae

1. Cediopsylla
   C. inacquulis inacquulis (Baker, 1895)
   C. interrupta Jordan, 1925
2. *Ctenocephalides* C. felis felis (Bouche, 1835)
3. *Echidnophaga* E. gallinae (Westwood, 1875)
4. *Hoplopyllus* H. (Eihoplopyllus) glacialis affinis (Baker, 1895)
   H. (Hoplopyllus) anomalous (Baker, 1904)

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5. *Pulex* P. irritans Linnaeus, 1758
6. *Xenopsylla* X. cheopis (Rothschild, 1903)

**G. Vermipsyllidae**

*Chaetopsylla* C. stewarti Johnson, 1955


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