

oviposit only in the trunk and out on the branches till they get down to, say, one inch and a half in diameter. I know of trees forty feet high, punctured by between two and three hundred females for their egg cells, that were thoroughly treated in three hours, with no more elaborate outfit than a small squirt-can oiler, and a quart of gasolene. Both schemes worked all right in so far as they have been tried, and up to this date no injury has resulted from using the gasolene. So, in the case of valuable trees a repellant can be tried, and if ineffectual, it can be followed up with a treatment of the egg cells.

In selecting the trees that suit them the beetles choose those of weakened vitality, their sense in this direction being very keen. It would be hard to say why a certain tree here, and one there, is chosen, but this feature is at once obvious to one following up their work.

I am led to offer these remarks since many in charge of valuable plantings have thrown up their hands in dismay over a simple matter like this. Were they confronted by some of the real propositions in boredom, I won't say whether they are among the lepidopters, or not, there might be some excuse for despair.

THE NORTH AMERICAN SPECIES OF LISPA (DIPTERA; ANTHOMYIDÆ).¹

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While the Anthomyidæ in general have justly acquired the reputation of being very difficult to classify, and at the same time highly uninteresting, there are a few groups that are not only easily recognized, but also of considerable scientific interest. If these were better known, it might take the curse off the family; fuller knowledge would inevitably create more interest, and with a few entomologists the family might become even a favorite. Hence it is very desirable that such genera as are susceptible of easy definition be worked out, as a beginning.

¹ This paper is one of the results of an investigation of western salt and alkaline lakes, carried on with the aid of an appropriation from the Elizabeth Thompson Fund.

The genus *Lispa* is one of these easily recognized ones. It belongs to the second section of the family, having the front broad in the male as well as in the female, and in this section differing from all its congeners in having in both sexes great dilated palpi, generally somewhat spoon-shaped, and either black or yellow in color. The species are found at the edge of water, and occur in abundance throughout the season everywhere in the United States; two or three species can be found in any neighborhood. Nothing definite is known about the larval habits, but by elimination it would appear that they must occur in the mud in the immediate vicinity of the adults. The commonest species are about the size, shape and color of a house-fly.

The known North American species agree closely in most of their characters, which are given below at some length to avoid repetition in the specific descriptions.

Generic Characters.—Front broad in both sexes, with a row of about 6 orbital bristles, the upper two curving backward or nearly erect, the rest curving toward the middle line; orbits hairy between the eye and these bristles; no hairs or bristles on the front between the ocelli and the antennæ; a large pair of ocellar bristles and numerous hairs between and behind the ocelli. Antennæ not very long, arista thickened at base, plumose. Face concave, epistoma projecting, with large vibrissæ and some smaller bristles, which continue back along the sides of the mouth cavity (in *palposa* the males and some females without vibrissæ, or these indistinguishable from the other bristles); facial orbits with small hairs, which in some species are continuous with those of the frontal orbits; head somewhat protuberant at the insertion of the antennæ, often with a contrasting black velvety transverse band turned up at the ends, across the base of the antennæ. Palpi greatly dilated at tip, either suddenly or gradually, more or less bare and glistening on the expanded portion. Proboscis short, small, horny, labella of medium size. Back of head protuberant, hairy; vertical bristles 2 pairs as usual; one pair of small post-verticals, occiput bare.

Thorax somewhat narrow and elongate, with the following chaetotaxy: dorsocentrals 5, 3 behind the suture (*nasoni* has 6, 4 behind the suture); acrostichal merely hairs; notopleural 2; presutural 1; posthumeral (intrahumeral) 1; humeral 2 or more; supra-alar 1; intra-alar 2; postalar 2; scutellar 2 (pairs); prothoracic (above the front

coxæ) 1 or more; mesopleural 1 in front near the protothoracic and a vertical row on hind edge; sternopleural 3 (1 in front and 2 behind). Calypters (tegulæ, squamæ) rather large, conspicuous, the hind one about twice as long as the other. Abdomen cylindrical, straight or convex, or moderately depressed, often with spots of yellow or white pollen on the last two segments; segments hairy, the hairs longer on the hind edge of the segment and especially on the sides, on the fourth and fifth these long hairs becoming bristle-like; hypopygium never very large. Legs hairy and bristly; the principal bristles of the front ones as follows; coxæ on fore side with numerous bristles not in rows except on outer edge; femora with a double row on upper and outer edge, and a single row on lower and outer edge; tibiæ with about three preapical bristles and sometimes one higher up, below the middle. Middle legs: coxæ hairy or bristly on foreside, femora sometimes elongate and then more slender on apical third, with one or more preapical bristles on the hind side above; tibiæ with one or two bristles on the outer side about the middle. Hind legs: femora with a row of bristles above, and another less complete on the lower and outer side; tibiæ with one or two bristles near the middle and several preapical.

Wings of simple structure, third and fourth veins parallel (convergent in some old-world species); no noticeable spots or clouds; anterior crossvein almost behind the tip of first vein; posterior crossvein distant less than its length from the margin (on the fifth vein).

The first comprehensive treatment of the North American species was by Stein, in his important paper on N. A. Anthomyidæ (Berl. Ent. Zeitsch., XLII, 161-288, 1897); he described three new species (*nigromaculata* subsequently proving to be a synonym of *palposa*), and identified three others. Starting from this basis, the student may consult two important papers on the European and palæarctic fauna respectively;—Kowarz, Wien. Ent. Ztg., XI, 33-54, 1892; and Becker, Zeitsch. f. Ent., XXIX, 1-70, 1904.

My study of the North American species indicates that the available characters for specific separation are few but sufficient. Head characters are the width of the front at the narrowest as compared with the entire width of the head, the measurement being in both cases at the level of the antennæ or even a trifle below, where the compound eyes are nearest together. The presence and coarseness of hairs on the sides of the face; presence of a black band across root

of antennæ; presence and size of the vibrissæ; and the shape, size and color of the palpi, are characters of importance. In the thorax and wings few specific variations occur in North American species, at least of a tangible kind. The legs are quite rich in characters when closely studied; three of the species show secondary sexual characters here, only one of which was known heretofore. The length of the hind tarsi of the males in comparison with their tibiæ is generally important, and the number and arrangement of the spines on the under side of the hind femora are very useful. The abdomen differs in form from cylindrical to depressed, and is variously marked with gray or white pollen. I have made no particular use of the hypopygium, although I do not doubt that it has a variety of forms quite distinctive when it is extirpated so as to be available for study, in the method of Schnabl and Dziedzicki.

The following table summarizes the data I collected from measurements of the species. The columns contain the following data:

Column 1, the quotient obtained by dividing the entire horizontal transverse diameter of the head by the distance separating the eyes at the point of greatest approximation (about the level of the antennæ), in the male sex.

Column 2, the same for the female sex.

Column 3, the quotient obtained by dividing the length of the hind tibia by the length of the hind tarsus, in the male sex.

Species.	1	2	3
<i>albitarsis</i>	3.85	2.74	.94
<i>antennata</i>	2.06	1.92	.98
<i>brevipes</i>	2.90	—	1.47
<i>johnsoni</i>	3.71 ¹	2.21	1.64
<i>nasoni</i>	3.10	2.51	1.06
<i>palposa</i>	2.62	2.50	1.37
<i>patellata</i>	2.70	—	1.08
<i>polita</i>	2.62	2.33	1.04
<i>salina</i>	2.44	2.06	1.00
<i>spinipes</i>	3.22	3.02	1.70
<i>sociabilis</i>	2.86	2.50	1.27
<i>sordida</i>	3.21	2.42	1.39
<i>tentaculata</i>	2.89	2.33	1.03
<i>uliginosa</i>	2.80	2.47	.98

¹ The only male of *johnsoni* is teneral, the head somewhat shrunken, and this number is undoubtedly too large.

The following figures will give an idea of the degree of constancy of the characters:

Five males of *salina* gave the following numbers for column 1—2.39, 2.45, 2.44, 2.42, 2.50. Average, 2.44; range, .11.

Eight males of *tentaculata* gave 3.00, 2.95, 2.76, 2.77, 2.72, 2.70, 2.74, 2.89. Average 2.82; range, .30.

Four males of *uliginosa* gave 2.77, 2.72, 2.89, 2.83. Average, 2.80; range, .17.

Four females of *nasoni* gave the following for column 2—2.40, 2.58, 2.50, 2.54. Average, 2.51; range, .18.

Three females of *tentaculata* gave 2.33, 2.34, 2.33. Average, 2.33; range, .01.

Four females of *salina* gave 2.00, 2.11, 2.06, 2.41. The last showed the character of the male in the front, and I re-examined it carefully. It was the only case of the kind that occurred, and as it appeared abnormal I excluded it from the average, which would then be 2.06, with a range of .11.

The following species mentioned in my Catalogue are not included herein; for the reasons given:

consanguinea. The dark tibiae are not decisive, as made out by Stein, and there is no evidence that the species as now accepted occurs in North America.

flavicineta. Not seen by Stein, and probably not North American.

hispida. Unrecognizable, and type not found by Stein in the British Museum.

nigromaculata. A synonym of *palposa*, but the fact was accidentally omitted in the Catalogue (Stein, Zeitsch. f. Hym. u. Dipt., 1901, 203, 209).

rufitibialis. Probably recognizable, but not known from the mainland of North America, and not seen by me.

serotina. I cannot make out any tangible characters.

The following species is added (mentioned in the appendix to the Catalogue, in the 1904 literature):

polita Coquillett, Invertebrata Pacifica, I, 34.—Ormsby Co., Nevada.

The bibliography since 1904 is mostly unimportant, consisting of notices of the occurrence of some of the widespread species in new

localities; it is therefore not mentioned herein except where something of special interest is brought out.

TABLE OF SPECIES OF *LISPA*.*Males.*

1. Fifth abdominal segment black, with a chalk-white central spot above, conspicuous from behind 2.
Fifth abdominal segment not so marked 7.
2. Second joint of middle tarsus shorter than the third *sordida* n. sp.
Second joint longer than third 3.
3. Palpi black, vibrissæ wanting *palposa* Walker.
Palpi yellow or whitish 4.
4. Hind tarsus as long as its tibia *salina* n. sp.
Hind tarsus shorter than its tibia 5.
5. Fourth joint of middle tarsus prolonged in a slender spine as long as the fifth joint *spinipes* n. sp.
Fourth joint not with spine; with unusually long hairs between and outside of the fronto-orbital bristles 6.
6. Vibrissæ delicate, hardly distinguishable; sides of face bare above
brevipes n. sp.
Vibrissæ normal, sides of face above with rather coarse hairs
johnsoni n. sp.
7. Front metatarsus with a prolongation beside the following joint 8.
Front metatarsus without such prolongation 9.
8. First two joints of front tarsi reddish; the second more than twice as long as the body of the first *tentaculata* De Geer.
Second joint hardly longer than the first *patellata* n. sp.
9. Front tarsus elongated (its first two joints as long as its tibia), pale in the middle, last point enlarged, triangular, black ... *albitarsis* Stein.
Front tarsus of ordinary form, about as long as tibia 10.
10. With four post-sutural dorso-centrals *nasoni* Stein.
With three 11.
11. Tibiæ black 13.
Tibiæ red 12.
12. Abdomen with a pair of large, shining black, sub-confluent spots on each of segments 2, 3, and 4; antennæ long, front narrowed below
uliginosa Fallen.
Abdomen pruinose, with only faint traces of spots; antennæ shorter, front not narrowed below *antennata* n. sp.
13. With distinct white spots on the 4th and 5th abdominal segments
sociabilis Loew.
Without such spots *polita* Coquillett.

spot each side on the posterior half; on the third the same parts are more shining; the posterior half of the fourth is shining, but narrowed at the sides; the third segment has appressed marginal macrochætæ, the fourth has about 4 discal and 8 marginal ones, not appressed; the posterior edge of the fourth sternite stands out from the body, is very hairy, and has a notch in the middle, as well as several bristles; fifth tergite moderately prominent, hairy and bristly, velvet-black, with a chalk-white median dorsal spot extending the whole length and about one-third the width. Organs of the hypopygium closely folded in, not distinguishable.

Legs entirely black, knees not appreciably lighter; front legs plain, the tarsal joints of regularly decreasing length; middle femora rather long, a little attenuated at tip, with two or three excessively long hair-like bristles on the front side at base and a few shorter, but still long ones on the under side at base; middle tibiæ long, with one bristle on the front outer side and two on the hind outer side, before the preapical; middle tarsus with a shortened second joint, which in specimens is generally bent at an angle with the first and third,—it is of normal structure, shorter than the third and about the same length as the fourth; hind femora rather slender, the under bristles strong, hind tibiæ with two small bristles near the middle; hind tarsi short, their tibiæ 1.39 times their length, first joint as long as all the others, which taper off and end in unusually small claws and no pulvilli.

Wings faintly brownish, veins brown. Length 6 mm.; of wing 5 mm.

Female.—Front wider than in the male, the head 2.42 times its width; tarsi of plain structure, hind ones barely shorter than their tibiæ; abdomen generally less shining, sometimes with median blackish stripe, fifth segment with 6 or 8 discal macrochætæ, fifth and sixth segments retracted, but with a trace of white mark above. Length 8 mm.; of wing 6 mm.

Numerous specimens of both sexes, collected at the edges of saline water (Box Elder Lake), Brigham City, Utah, July 4 and 5, 1911.

***Lispa palposa* Walker.**

Male.—Front nearly black (the head 2.62 times the front in width), upper part of the ocellar triangle brown, orbital margins narrowly yellowish, with a single row of hairs next to the eye; a very striking velvety black band from eye to eye at the level of the insertion of the antennæ and below; antennæ black, the first two joints velvety, arista long-plumose; sides of face with a clear silvery sheen, bare except low down; middle of face concolorous; vibrissæ hardly distinguishable from the small bristles of the sides of the mouth; palpi velvety black, suddenly enlarged about the middle, with long black hairs on the front and lower edge; proboscis black, of ordinary form; the usual erect small bristles of the back of the head arranged somewhat in rows.

Thorax black in ground color, gray pruinose, with the beginnings of four black stripes in front, the median two more distinct and extending farther back; chætotaxy normal; calypteres ivory-white with brown border; halteres yellow with brown knob.

Abdomen rather depressed for a ♂, black, almost shining, with the following parts light gray pruinose; a broad anterior spot on each side of the second and third segments, connecting with a broad central portion extending the whole length of the segment; on the fourth segment the lateral spots are even larger and sometimes brown pruinose, while the central spot is small and indistinct, so that the middle is shining black in front; fifth segment velvety black, with a triangular pure white pruinose spot above, very conspicuous. Venter blackish gray, with long bristles on the first segment. Bristles of the sides of the abdomen rather abundant, appressed on the second and third segments, erect and dense on the first, fourth segment with about three discal on each side and a row of marginal slightly interrupted in the middle; fifth with rather delicate but numerous bristles.

Wings subhyaline, of normal form.

Legs black with thin whitish pruinosity; knees hardly at all lighter; middle femora a little slender toward the apex, tibiae with a pair of bristles on the outer side just below the middle; hind femora below with a row of about 9 bristles, becoming long and slender past the middle, and a single bristle on the hind and outer side below the middle of the tibia; the tibia has also rather long hairs on the outer side; hind tarsi considerably shorter than their tibiae (tibia 1.37 times the tarsus), the first joint almost as long as the other four. Length 6 mm.

Female.—Head about 2.50 times the front in width, but varying somewhat; face with a few scattering hairs on the sides; vibrissae generally well developed. Abdomen more flattened, the median gray areas of the second and third segments wider and more diffuse and with a slender longitudinal line in the middle. Hind tarsus longer, almost equaling its tibia, the first joint considerably shorter than the following four. Length 6.6 mm.

In both sexes the front is not at all narrowed below. The abdominal coloration as usual is sometimes not quite so well developed as described above.

Many specimens: Lawrence, Kans.; Brookings, Elmira and Pierre, S. D.; Cache Junction, Utah; Moscow and Elk River, Ida.; Hood River, Ore. Some of the specimens are cotypes of Stein's *nigromaculata*.

***Lispa salina* new species.**

A large, hairy, gray species, with yellow palpi and a conspicuous white spot on the tip of the abdomen in the male.

Male.—Head 2.44 times front in width; front brown, this color running to a point near the antennae between two black patches which fade into brown above; around and behind the ocellar triangle are numerous small hairs; the upper two pairs of orbital bristles divergent, the remainder, about 6 pairs, decussate; a row of proclinate hairs on the orbit outside the bristles; viewed

from below, the lower projecting edge of the front is black from the insertion of the antenna obliquely upward to the eye. Antennæ velvet black, third joint hardly twice as long as the second and more slender than it, arista thickened on the basal third and with about a dozen long hairs, none originating beyond the middle. Sides of face silvery above on the outside of the ptilinal suture, the rest brassy, hairy outside the suture from the middle of the silvery part to about the lower corner of the eye. Palpi rather dark yellow, enlarging with moderate suddenness toward the tip, of medium size for the genus, hairy all over except a small space beyond the middle. Proboscis black, shining. Back of head convex, more so below, gray with bushy black hair, which is especially long on the oral margin; occiput with hairs above and a pair of post-vertical bristles, bare below these.

Thorax gray, with black hair almost all over, bristles as usual in the genus; pleuræ concolorous with dorsum, bare behind the front and middle coxæ and in front of the prothoracic spiracle. Calypters wax-white with yellow border. Halteres with brown knob, stem yellow.

Abdomen robust, gray all over the first four segments, slightly yellowish above, with long hair; along the sides some macrochætæ are hardly distinguishable from the large hairs; 4th segment with a terminal circle of macrochætæ and a discal row that is interrupted in the middle; 5th segment velvet black, hairy, with a conspicuous median dorsal chalk-white spot.

Legs very hairy, gray throughout, the tarsi more blackish with pale yellow pubescence below, pulvilli pale yellow. Front legs: coxæ with a row of strong bristles on anterior side; femora with a double row of bristles on upper outer side and a single row on lower; middle femora with two preapical bristles; middle tibiæ with two bristles near the middle; hind femora with the usual rows of long bristles and besides them numerous very long hairs below on the basal two thirds; hind tibiæ exactly equal to their tarsi in length, with one bristle near the middle. All the tarsi have the basal joint shorter than the other four combined, the latter of approximately equal length in each tarsus.

Wing subhyaline, veins yellowish toward the base, 3d and 4th veins not convergent.

Female.—Head about 2.06 times front in width; abdomen with a dark median line (sometimes faintly visible on the basal segments in the ♂), and sub-shining blackish lateral spots on the hind margin of the second and third segments; the median stripe is usually widened on the anterior part of the second and again on the third segment; 4th segment entirely sub-shining blackish; 5th segment minute, black. No long pile on under side of hind femora. Length, ♂, 5.5–7.2 mm.; ♀, 6.5–9.5 mm.

Many specimens of both sexes: South end of Great Salt Lake, Utah, July 31, 1908 and July 9, 1911; Pyramid Lake, Nevada, July 16, 1911; Walker Lake, Nevada, July 25, 1911; Borax Lake in Lake Co., California, August 8, 1911.

I sent some of this material to Mr. Theodor Becker, Liegnitz, Prussia, in 1908, as he had recently published a revision of the palæ-arctic species of *Lispa*; he informed me that he could not distinguish this species from one which he had described as *L. cinifera*, from Siberia. Since then I have referred it to that species until very lately, when I have come to the conclusion that it is different. *Cinifera* is known in only a single ♂ specimen, not very well preserved, and a complete comparison cannot be made. The description of *cinifera* states that the hind metatarsus is longer than all four of the following joints, a rather striking character which does not apply to *salina*; the long pile of the under side of the hind femur is not mentioned in the description of *cinifera*, but is conspicuous in *salina*. These with some slighter discrepancies, together with the wide difference of locality, lead me to believe that it would be dangerous to accept the view that *cinifera* includes our American form.

This is a very characteristic fly of the shores of the denser salt and alkaline lakes of the West. Although I did not find the larvæ, they will probably be found under the beach refuse, which in the case of Great Salt Lake consists almost entirely of the puparia of *Ephydra gracilis* Pack.

***Lispa spinipes* new species.**

A smallish gray species with narrow front and face, the short 4th joint of the middle tarsus in the ♂ ending in a long slender appressed spine, which reaches to the tip of the slender 5th joint.

Male.—Front much narrower than either eye (the head 3.22 times its width), hardly narrowed toward the antennæ; face narrow, especially the sides, which have only a single row of small hairs, none above the middle; the whole face pale yellow, more whitish at the edges; vibrissæ very small; antennæ wholly black, of ordinary form; palpi yellow, of moderate size for the genus and widening to the apical part with about the usual suddenness, with a few black hairs except on the middle of the dilated part.

Thorax wholly gray, with the usual chætotaxy; halteres yellow with brownish knob, calypters white with faint yellow margin.

Abdomen gray, no median stripe, sides of second and third segments very faintly darker behind, fourth segment changing to yellowish; fifth segment black, almost all the dorsal half pure white; hypopygium inconspicuous, black.

Legs uniformly gray except the knees and a little of the base of each tibia, which are yellowish red; pulvilli rather small, brownish; front tibiæ with only subapical bristles, their tarsi longer than the tibiæ; middle femora slender toward tip; middle tibiæ with two smallish bristles just beyond the middle; middle tarsi considerably shorter than their tibiæ, the second, third and

fourth joints all short, the fourth ending in a spine which continues along the fifth joint to the claws; fifth joint attached to the fourth at one side before the tip, much longer and more slender than usual. Hind tibiae with a row of small bristles down the hind side, one of which beyond the middle is of uncommon length. All the femora are rather slender. Hind tibiae 1.70 times as long as their tarsi.

Wings of ordinary structure, hind crossvein not much more than half its length from the margin, straight and moderately inclined. Length 5.5 mm.; of wing 3.8 mm.

One ♂, collected by me at Lake Elsinore, California, on August 2, 1911. One ♂, one ♀, Lewiston, Ida., Aug. 2, 1912. The female is rather teneral and the head and front width cannot be accurately determined; the front is evidently narrow however. The middle tarsi are of simple structure.

Lake Elsinore is a moderately alkaline body of water; but *spinipes* it appears is found also in fresh water, as at Lewiston, Idaho; in this respect it is unlike *sordida*, *salina* and *antennata*, which have been found so far only at alkaline or salt water.

Lispa brevipes new species.

Male.—Eyes nearest together at the level of the antennæ, where they are separated by considerably less than the width of one eye (head 2.9 times the width of the front); front blackish anteriorly, brown above, the acuminate brown ocellar triangle indistinct toward the antennæ; frontal orbits with long hairs between and outside the bristles; a heavy black band connects the eyes across the base of the antennæ, slightly up-turned at the eyes, just as in *palposa*; antennæ velvety black on first two joints, the second not with paler apical margin, third joint as usual; sides of face silvery, without hairs except a few on lower part; middle of face brassy; vibrissæ decidedly less developed than in most species, with numerous hairs on the outer side of each; palpi brownish-yellow, not quite so large nor so suddenly dilated as in *tentaculata*, moderately hairy. Thorax on the dorsum grayish, sub-shining, a paler pruinose median stripe, which disappears posteriorly and has a faint brown stripe upon it; the beginning of another gray stripe each side at the front end of the dorsocentral rows; humeri gray; chaetotaxy normal; halteres with brown knob, calypter ivory-white with yellow border; wings normal. Abdomen rather flat and wide, the first four segments almost uniform light-gray dusted, fifth segment black, with a conspicuous chalk-white, almost silvery triangular median dorsal spot; fourth segment with discal and apical row of bristles; venter unicolorous, a little darker than dorsum, fourth sternite with a deep, rounded incision. Legs including the knees entirely black, with uniform gray pruinosity; front tarsi of almost the length of their tibiae, the first joint fully as long as all the rest; middle tarsi about three fourths as long as their tibiae, slender; hind tibia 1.47 times as long as its tarsus, the basal

joint of the tarsus somewhat thickened, about equal to the following four, the second longer than the third. Front tibia without a bristle at the middle; middle femur slender beyond the middle, the bristles on the basal part rather long and slender; middle tibia with two bristles below the middle; hind femur not very stout, with long slender bristles in the row beneath, the tibia with long hairs on the outer side and one bristle below the middle. Length 6 mm.

One male, Moscow, Idaho, August 6, 1912. The female has not been discovered.

In this species the band across the base of the antennæ resembles *palposa*, and the rather dark palpi and faint vibrissæ tend in the same direction but to a less degree. The absence of pattern on the abdomen shows more of a likeness to *johnsoni*, which however has fully developed vibrissæ.

***Lispa johnsoni* new species.**

Male.—The only male specimen is somewhat teneral, and the front part of the head is shrunken, making a full description difficult. The front appears to be much as in *brevipes*, and there are indications of the black band across the base of the antennæ; the hairs between the fronto-orbitals and outside them are long and coarse; the sides of the front have hairs almost up to these but not so large, although well developed for the location; vibrissæ of full size, and a row of good-sized bristles extending back from them along the epistoma; antennæ in the specimen teneral and shrunken, not showing any unusual features. Palpi dark yellow, slightly brownish, of full size for the genus, rather suddenly enlarged, hairy all over except a small space near the distal edge of the disk. Thorax gray, sub-opaque, very indistinctly striped, or with faint indications of stripes, the bristles strong; a small prescutellar pair is present, otherwise the chætotaxy is normal; halteres with a brown knob; calypters ivory-white with yellow margin; wing normal. Abdomen not flattened, near the base having a section like an equilateral triangle with the corners rounded, almost unicolorous gray, with a slender abbreviated median blackish stripe and on the lower part of the side in the third and fourth segments a trace of a dark triangle; fifth segment black with a distinct chalk-white median dorsal spot. Fourth segment with irregularly placed bristles on the sides of the disk, and a marginal row. Legs wholly black, including knees, gray dusted; femora rather stout and hairy; front tarsi fully as long as their tibiæ, the first joint almost as long as the following four; middle tibia with two spines considerably below the middle; hind tibia with one stout bristle below the middle, 1.64 times the length of the tarsus, first joint of the tarsus not quite so long as all the rest; the hind femur has on the lower edge the usual row of about ten slender hairlike bristles.

Female.—In good condition. Head 2.20 times as wide as front, the latter with a velvet black band sharply defined on its lower border; first two joints of antennæ velvet black; sides of face rather coarsely hairy all the way up

to the front; vibrissæ strong; palpi as in the male. Thorax gray with two well-defined narrow blackish stripes destitute of hairs inside of the dorso-centrals, not continuing much back of the suture; outside the dorsocentrals a less distinct stripe. Abdomen gray with a black median stripe extending to the fourth segment. Hind tarsus as long as the tibia. Length, 6.8 mm.

One male, two females, Cohasset, Mass., Sept. 9, collected by C. W. Johnson.

This species is rather closely allied to *salina*, but in the male has the hind tarsi shortened and the hind femora destitute of the very long, almost woolly hairs of that species; in the female the palpi are larger, darker, and more hairy than in *salina*.

The difference between *johnsoni* and the Central Asian *cinifera* is not easy to state, as in each the male is known only from a rather poorly preserved specimen; they are closely allied.

Lispa tentaculata De Geer.

Male.—Head 2.89 times the width of front, the latter narrowed somewhat strongly below, the sides convex; the narrowest point is below the insertion of the antennæ, and is about the same as the width of one eye at the widest point (looking from straight in front); color of front black, indistinctly brown on the ocellar triangle and narrowly forward from it, the orbits becoming gradually yellow about the middle, which color continues down the side of the face without interruption; the fine hairs of the frontal orbit continue without interruption down the side of the face; antennæ black, second joint faintly and narrowly yellowish at apex, third reaching nearly to the single bristle above the vibrissa, arista rather long plumose; face including its sides golden yellow pruinose, the sides with a few fine hairs which extend almost to the lower edge of the eye; vibrissæ strong, with some smaller bristles which are more numerous and slender posteriorly; palpi very large, shining pale yellow, suddenly enlarged about the middle, the apical broad part with scattered black hairs.

Thorax black in ground color, grayish pruinose, sub-shining with a median vitta abbreviated in front and two less distinct lateral vittæ along the dorsocentrals, at the extreme front two black vittæ begin between these, but fade away in a short distance. Chaetotaxy normal; calypteres ivory white, with yellow margins; halteres dark yellow. A tuft of small black bristles arises from just behind the metathoracic spiracle.

Wings entirely normal for the genus.

Abdomen very broad and flat; the first segment grayish pruinose; the second segment with white pruinosity anteriorly on the sides, which changes to yellowish and extends mesially and posteriorly so as to leave three areas shining black—the hind part on each side and the middle part in front; third segment with a large definite white pruinose spot on each side against the front border, and a median yellowish brown pruinose spot on the hind margin,

the rest shining; fourth segment with a still larger white pruinose spot on each side against the front border, the rest shining; fifth segment wholly shining black, but little visible. Venter grayish white. Bristles of abdomen not of noticeable size except on the fourth and fifth segments.

Legs and pleuræ covered with plumbeous pruinosity; knees yellow; front tarsi of very characteristic structure, longer than their tibiæ, the first joint short, usually yellow, with a tuft of black bristles below, and prolonged in a yellow process along the side of the second joint, the process one half longer than the first joint itself, and with a black tip; second joint yellow, about half as long as the tibia; remaining joints becoming darker, longer than in most species. Middle femora rather slender and blackish toward the apex, with only short hairs and bristles, their tibiæ with a single bristle on the outer side at the middle, their tarsi slender and long, a little pale at base; hind femora with long, slender bristles or hairs below in a sparse row beginning before the middle, the tibiæ with about three irregularly spaced bristles on the hind side and soft, long hair on the inner side; hind tibia 1.03 times the tarsus, first joint of the latter with a brush of hair below, not much over half as long as the four following. Length 5.5 mm.

Female.—Head 2.35 times the front in width; front tarsus black, the first joint of ordinary form, nearly twice as long as the second, the whole tarsus about $1\frac{1}{2}$ times the length of the tibia, hind tarsus a little longer than its tibia; the hind femur generally has a single long, hairlike bristle on the under side beyond the middle (occasionally two). Palpi not quite so shining, but nearly as large as in the ♂. Length 7 mm.

This is the most abundant species; Becker reports it everywhere common in Europe around fresh water, also from the Canary Islands and Central Asia. I have it in abundance from South Dakota, Kansas, Idaho, Utah, Nevada, Oregon and Washington, and it has been recorded from New England and California. It is seldom sought in vain at the edge of fresh water during the entire collecting season, in my experience.

Sociabilis and *patellata* are very closely related to this species; the differences I have summarized under their respective descriptions.

***Lispa patellata* new species.**

Male.—Head 2.70 times the width of front, the latter widening very slightly above, blackish including the middle and upper parts of the orbits; the last with fine hairs which continue uniformly down the sides of the face; entire face including sides brown pollinose, no band across root of antennæ; antennæ black, second joint at tip with a white pollinose roundish spot when viewed diagonally from below; arista rather thin pilose; vibrissæ large, with smaller bristles extending back under the head; palpi of immense size, glistening white, slightly flesh-colored, as wide as the full length of the antenna and the enlarged part nearly a half longer, suddenly widened downward from the

stalk-like portion, with only a few hairs, which are on the lower edge and the inner side. Thorax narrow, slightly brownish-black, not with noticeable vittæ; hairs and bristles well developed, chaetotaxy normal; pleura changing color to a somewhat glaucous below; calypters white, with pale yellow border; halteres yellowish; wings of ordinary structure, the veins brownish toward the base. Abdomen considerably flattened, oval in outline; second, third and fourth segments with successively larger white pollinose triangles on the sides, middle of second and third segments with an indistinct yellowish pollinose spot; otherwise the abdomen becoming more shining black toward the tip; fifth segment black, showing very little from above; bristles of abdomen not very large. Legs wholly black except the first and second joints of the front tarsus, which are more or less reddish,—the first short, with a process extending along the outer side of the second, nearly as long as the first and two thirds as long as the second, the following joints of the front tarsus black and somewhat flattened; middle and hind femora moderately elongated and slender, the latter with two or three slender bristles below beyond the middle; middle tibia with a small bristle on the hind side at the middle, hind tibia with a bristle on outer side at the middle, 1.08 times as long as its tarsus. Length 6 mm.

Female.—I am unable to indicate any satisfactory character on which to separate the ♀ from that of *tentaculata*.

Seven males: Boulder, Colo.; Moscow, Kendrick, Peck, Juliaetta and Potlatch, Idaho. Dates in Idaho are April 18, June 11, 18 and 28, and September 10. Two females collected at Boulder, which may be this species (I got no males of *tentaculata* while collecting there), have reddish middle and hind tibiæ, comparatively small palpi, and brown dust on the thorax.

The type locality is Moscow.

Lispa albitarsis Stein.

Male.—Front narrow, especially below (head 3.85 times the width of the front, the narrowest front in the genus); the usual acuminate frontal triangle very indistinct; sides of face very narrow, with a few hairs all the way up; whole face light brassy yellow; antennæ black, third joint rather long, arista brownish-yellow, loosely plumose; second joint with indistinct brownish-yellow band at apex; vibrissæ large and stout, on the outer side of each a few coarse hairs curving downward; cheek very narrow below the eye; palpi yellow, gradually expanded from the base, the widest part narrower than in any other species found in North America, equal to about one third the length of the third joint of the antenna. Thorax rather narrow, glaucous on the anterior half with three brown stripes, which become indistinct on the more shining portion behind the middle. Coxæ and femora black, the front coxæ silvery in front, with few bristles; front tibia black; front tarsus elongated, once and a third the length of the tibia (tibia is .74 the length of the tarsus);

first joint long and slender, pale at tip; second and third joints of medium and equal length, slender, yellowish-white; fourth and fifth joints flattened, black, the claws large and divergent; pulvilli enlarged, snow-white; middle tibia and tarsus rather dark brown than black, the former with a large bristle below the middle on the front side, and a smaller one above it on the hind side; hind tibia yellowish-brown, darker toward the base, with only two bristles before the apical ones,—these two are on the outer side; the hind tibia is .94 times the length of the hind tarsus; the latter dark brown; the hind femur has two large bristles on the under side, before the middle. Wings ordinary, calypters white with pale margin, halteres yellow. Abdomen depressed, mostly shining black above, but with a white pollinose transverse spot on the hind edge at each side on segments 1, 2, and 3, which runs over a trifle upon the front edge of the succeeding segment; also one large bristle on each side of segments 2 and 3, and on the fourth segment a terminal circle of six and a sub-basal lateral pair; hypopygium small and retracted. Length 4 mm.

Female.—Head 2.74 times the width of the front; frontal triangle as usual; thoracic stripes not distinct; front tarsi hardly longer than tibiae, plain, the tibiae brownish-yellow at base; hind femur with only one moderate bristle below; middle tibiae brownish, the hind ones reddish-brown, near the base with a darker ring. Length, 5.1 mm.

Two males and one female, from the type lot: Lawrence, Kans., Tifton, Ga., Opelousas, La.

A somewhat aberrant species, very well marked.

***Lispa nasoni* Stein.**

Male.—Front wide above, considerably narrowed at the antennae, where the eyes have enlarged facets; head about 3.10 times the narrowest width of front; orbits yellowish pollinose; face rapidly widening below, wholly silvery with a yellowish tinge, the sides with small scattering hairs meeting those of the frontal orbit, antennae deep black, a distinct red band at tip of second joint, third joint somewhat elongated; cheek below eye rather wide; palpi yellow, gradually widened from the base, the greatest width only about half the length of the third antennal joint, with a few black hairs except on the disk. Thorax cinereous, with a fairly distinct median brown stripe extending to the tip of the scutellum, a less distinct lateral stripe each side, and some indications of another outside this, mostly behind the suture; four dorso-centrals behind the suture, the anterior two of them smaller than the posterior two; halteres yellow; calypters white, border very pale. Legs black, the femora rather broadly at tip, and all the tibiae, yellow. Front coxae with only about ten bristles on the front side,—less than in most species; middle tibia with a medium bristle on the outer front side about the middle, and a small one opposite it on the outer hind side; hind tibia 1.06 times the length of its tarsus, with a medium bristle below the middle on the outer side; hind femur with a short row of only three bristles on the outer side below, ending

about the middle, and generally a single bristle in place of the inner row. Abdomen cinereous, with a pair of shining black spots on each of the first four segments, the first pair small and indistinct; the median cinereous line is of the same color and texture as the rest of the cinereous surface (in *uliginosa* generally delicate and indistinct); fourth segment from a third to a half the length of the third; fifth segment rounded, with an inverted V-shaped notch below. Wings of ordinary structure. Length, 5 mm.

Female.—Head and front wider, the proportion about 2.51; hind femora below with only one bristle. Length 6 mm.

Eleven specimens of both sexes, six of them from the typical material determined by Stein; South Dakota; Louisiana and Georgia (Hough); Redwood City and Lake Elsinore, Cal.; Winnemucca and Pyramid Lakes, Nev.; Roswell, Ida.; Havana, Cuba (C. F. Baker). One male has on the hind femur four bristles in the outer row below and three in the inner.

The species is most related to *uliginosa*, from which it differs in the number of dorso-central bristles, and in the ♂ by having a shorter abdomen, fewer and more delicate hairs on the sides of the face, dorsum more distinctly striped, narrower face, and fewer bristles on lower side of hind femora.

Lispa uliginosa Fallen.

Male.—Head 2.80 times as wide as front, the latter wide above, narrowing appreciably toward the antennæ, with the usual long, narrow frontal triangle; margins a little silvery below the middle; compound eyes with a distinct area of enlarged facets about the level of the antennæ; antennæ of usual form, black, the second joint with a transverse yellow band at tip, which looks whitish in certain lights; face including its sides and the anterior part of the cheeks yellowish-gray, with a somewhat silvery reflection; sides of face with a few hairs extending up to the front, at the level of the vibrissæ these are quite strong; palpi pale yellow, gradually enlarged almost from the base, not very wide in the widest place—hardly half as wide as the length of the third antennal joint—with a rounded bare spot in the widest place, elsewhere with coarse black hairs. Thorax only moderately pollinose, half-shining, with strong bristles arranged as usual; halteres yellow, calypters white with pale yellowish border. Legs black, except extreme apices of the femora and all the tibiæ, which are yellow; tarsi entirely black; middle tibia with a long bristle on the front side well below the middle, and a small one on the hind side at the middle; hind tibia .98 times the length of its tarsus, with one bristle on the outer front side below the middle, and a row on the outer hind side, of which the one at the middle is largest; hind femora with two rows of stiff, rather short bristles below, and the usual strong row above. Abdomen long and almost cylindrical, the fourth segment hardly half as long

as the third; fifth protruding in almost hemispherical form, the first four segments have each a large shining black spot on the dorsum, interrupted by a rather indistinct median gray pruinose line; on the second and third segments these spots are triangular, narrowing forward almost to a point, while behind they are almost as wide as the dorsum; along the side of the second and third segments there is an indistinct brown streak; remainder of abdomen ashy-gray pollinose, the hairs arising from brown dots. Wings as usual. Length, 6 mm.

Female.—Head about 2.47 times as wide as front; sides of face considerably wider and more hairy, otherwise all the characters of the male are found, even the enlarged facets; in the place of the two rows of bristles on the lower side of the hind femur there is only a single bristle or sometimes two. Length, 7 mm.

A common and widespread species, occurring in Europe and throughout the United States. Specimens are in my collection from Buffalo, N. Y. (M. C. Van Duzee); Algonquin, Ill. (Nason); Brookings, S. D.; and a number of places in Idaho, Utah, Nevada, California and Washington. It is on record from St. Vincent, W. I.; Mexico; Florida, Ontario, etc.

***Lispa antennata* new species.**

A slender species with opaque abdomen, wide sides of face and cheeks, and second antennal joint tipped with reddish-yellow.

Male.—Head 2.06 times as wide as front, the latter very little narrowed at the antennæ, frontal orbits narrow, more distinctly yellow anteriorly; antennæ black, second joint at tip narrowly reddish-yellow, which changes to whitish when viewed from below, third joint short, arista with long plumosity; face wholly grayish-white pollinose, wide above and rapidly becoming still wider below on account of the triangular form of the facialia, which are nearly as wide at the level of the vibrissæ as the sides of the face are; the hairs of the frontal orbits continue down on the sides of the face or facial orbits to about the level of the vibrissæ, but are scattering on the upper part; a single large vibrissa with three or four small bristles in a row laterad across the lower end of the facialium; palpi light yellow, with a rather sudden enlargement, covered with scattering black hairs except on the outer side in front, where there is a bare, glistening whitish spot.

Thorax cinereous, with no dark longitudinal lines except at the very front edge; chætotaxy normal, bristles well developed; pleuræ concolorous; halteres yellow; calypteres ivory-white.

Abdomen cylindrical, cinereous, second and third segments each with a dull blackish spot on each side, rather faint (on the first segment still fainter); fourth segment capable of a good deal of retraction and generally exposed for a much shorter length than the preceding ones; fifth segment very narrow and visible only for a small space dorsally; hypopygium of moderate size, con-

colourous with rest of abdomen; third and fourth segments with a row of marginal bristles, first and second with irregularly placed bristles along the sides; third segment with a V cut out beneath where the sternite would be.

Femora black, robust, tibiae rather dark yellow, tarsi yellow, infuscated toward the tip, with large yellowish pulvilli. Front tibia with a bristle beyond the middle on the outer side, and one on the front side a little lower down; front tarsi plain; middle femora with a row of bristles on the front side that extends only to the middle, and two preapical bristles on the hind side; middle tibia with a bristle on the outer hind side just beyond the middle and another on the outer front side a little lower down; hind femora with the usual three rows of bristles; hind tibia .98 times the length of its tarsus, with a bristle below the middle on the hind side, above this a row of two to four small bristles, and below it on the outer side a small bristle.

Wings of ordinary structure, the veins yellowish. Length 7.3 mm.; of wing 5.2 mm.

Female.—Head 1.92 times the front in width; sides of face wider and more hairy; palpi not so suddenly enlarged, but about as wide; a faint brown line in the middle of the thoracic dorsum; a single bristle on the under and outer side of the hind femur, representing the row that occurs in the ♂; hind tibia. Length 7.4 mm.; of wing 5.8 mm.

Fifteen specimens, of both sexes, collected at Pyramid Lake, Utah, along the shore at the south end, July 16, 1911.

Lispa sociabilis Loew.

Centuries, ii, 72.

Male.—Almost like *patellata*, but with the following differences: head 2.86 times front in width; palpi less widened, but still very large, about as wide as the length of the third antennal joint, while in *patellata* they are fully as wide as the length of both second and third; color as in *patellata*, almost white, glistening, and with few hairs. Front tarsi with first joint yellow, on the outer side with only an insignificant point where the prolongation occurs in *patellata* and *tentaculata*; second joint yellow, sometimes blackened from the middle, about three fourths as long as the first joint, the remaining joints of nearly equal length, black, somewhat flattened; all knees and extreme tips of tibiae yellow; middle and hind tarsi yellow on under side at least to tip of first joint; hind femur generally destitute of slender hairlike bristles on under side beyond the middle, occasionally with only one; middle tibia without bristle near middle. Hind tibia 1.27 times as long as its tarsus.

Female.—Head about 2.50 times the front in width, but somewhat variable; palpi nearly as in the ♂; front metatarsus nearly as long as the three following joints, blackish; middle tibia with one bristle near middle; hind femur with one bristle below, beyond the middle (absent in one out of four); tibiae almost entirely black. Length of ♂, 6 mm.

Seven ♂'s, four ♀'s, Trenton, Lucaston and Iona, N. J.; Mont-

gomery Co., Pa.; Jackson, Miss. Dates, May 16 and 26, Aug. 11, 15 and 21, Sept., 11, Oct. 5 and 30.

The three species, *patellata*, *tentaculata*, and *sociabilis*, form a group in which the males are separated mainly but readily on secondary sexual characters, while the females offer almost no tangible differences. The group has the tessellated pattern better developed on the abdomen than in the rest of our species, and about equally in both sexes.

***Lispa polita* Coquillett.**

Coquillett, Invertebrata Pacifica, i, 34.—Ormsby Co., Nev.

Harbeck, Entomological News, xx, 46, oc. in N. J.

Male.—Wholly black, the only yellow ground color being in the palpi and a band across the apex of the second joint of the antenna; head 2.62 times the width of front, the latter wide, rather golden along the orbits below; antennæ ordinary; face wide, sordid yellowish white, the sides with fine, sparse hairs, coarser next the vibrissæ; palpi yellow, the basal part whitish, widened gradually from the base, the widest part a little over half as wide as the length of the third antennal joint, with a round, shining space thereon. Thorax sub-shining, with a delicate brownish pruinosity, especially around the humeri; bristles strong, arranged as usual. Abdomen almost cylindrical, shining black, with only the most delicate brown pruinosity; fourth segment one third as long as the third; fifth segment hemispherical; bristles rather strong on the sides and near the apex. Femora all a little thickened, the hind ones with two rows of rather short, strong bristles below; middle tibia with a bristle on the front side below the middle and one on the hind side at the middle; hind tibia 1.04 times as long as its tarsus, with one bristle on the outer front side below the middle, and a strikingly long one opposite it in the row on the hind side. Halteres dark yellow, calypters yellowish with brownish-yellow margin. Wings rather infuscated, the base brownish. Length, 7 mm.

Female.—Head 2.33 times as wide as front; sides of face wider and with more numerous hairs; hind femur with only three or four bristles below; abdomen more oval, not so cylindrical, but very shining; femora hardly thickened; calypters paler. Length 6.6 mm.

Two males, Moscow, Idaho, Aug. 23, and Viola, Ida. (only 8 miles from Moscow), Aug. 21; one female from the type lot, Ormsby Co., Nevada, collected by C. F. Baker and lent me by C. W. Johnson. As shown above, it has been reported from New Jersey.

The structural characters of the species resemble those of *uliginosa*, but the shining black color is very distinctive. The abdomen of the male is longer than that of the female, giving a greater total length in the few cases examined.



Aldrich, John Merton. 1913. "The North American Species of *Lispa* (Diptera; Anthomyidæ)." *Journal of the New York Entomological Society* 21, 126–146.

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