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**A SEARCH FOR *ALLOPERLA ROBERTI* SURDICK
IN NORTHWESTERN ILLINOIS (PLECOPTERA: CHLOROPERLIDAE)**

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**TECHNICAL REPORT 1997 (11)
ILLINOIS NATURAL HISTORY SURVEY
CENTER FOR BIODIVERSITY**

PREPARED FOR

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Office of Resource Conservation
Illinois Department of Natural Resources
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Lincoln Tower Plaza
Springfield, IL 62701**

Abstract

Two adult males stoneflies of unknown species were collected from “Rock Island, Illinois” in 1860 by B. D. Walsh. These specimens were designated as *Alloperla banksi* by T. H. Frison in the middle of the century. Later, they were determined to be a new species, *Alloperla roberti*, by R. D. Surdick in 1980. To date, these remain the only specimens in existence of a federally listed, extinct, Illinois endemic stonefly. Forty-three sites in Carroll, Henry, Jo Daviess, Rock Island, and Whiteside counties, Illinois, were surveyed for *A. roberti* during the spring and summer of 1997. We found no specimens of *A. roberti* during sweepnetting and lighttrapping of these streams. No doubt of their extinction should exist at this point. It seems no additional effort would uncover a population of this stonefly. Streams in the region were so heavily impacted due to widespread logging, mining, row crop agriculture, and urban sprawl that sensitive species of aquatic insects were limited to springheads and springbrooks, and to a very few streams receiving surface drainage.

Six other stoneflies species were collected during the study. These included *Amphinemura delosa* (Frison), *A. varshava* (Frison), *Clioperla clio* (Newman), *Isoperla bilineata* (Say), *Nemoura trispinosa* Claassen, and *Perlesta decipiens* (Walsh). *Amphinemura varshava* was the most widespread of these and exhibited some tolerance of silty, warm conditions in small streams. Both *A. delosa* and *N. trispinosa* were inhabitants of springfed streams, while the latter had high population densities only at springheads or in nearby springbrooks. The only stoneflies to frequent larger waterbodies were *P. decipiens*, found in small-to-medium-sized rivers, and *I. bilineata*, found exclusively in very large rivers.

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Benjamin Dann Walsh, the first State Entomologist in Illinois, collected two adult male stoneflies (Insecta: Plecoptera) from near his home in "Rock Island, Illinois" in 1860. He recorded no more information about these specimens than provided here. Frison (1942) later included these two males as paratypes in his description of *Alloperla banksi*. Surdick (1981), during revisionary work on the family Chloroperlidae, removed these specimens from *A. banksi* and described them as a distinct species, *A. roberti*. *Alloperla banksi* is now known from only as far west as Michigan (Stark *et al.* 1986). No additional specimens of *A. roberti* have been collected since 1860.

Stark (<http://www.mc.edu/~stark/stonefly.html>, May 1997 update) currently recognizes 29 North American species of *Alloperla*. No complete life histories have been published for any of these species (Stewart and Stark 1988). Fragmentary information indicate that nymphs transform to the adult stage in April and May in the Southeast states (Surdick and Stark 1980), May and June in Illinois (Illinois Natural History Survey [INHS] collections) and the Central Highlands of Arkansas and Missouri (Poulton and Stewart 1991), and June through August in Alaska and the Yukon Territory (Stewart and Stark 1988). *Alloperla* species usually inhabit small, permanently flowing streams of high quality (Poulton and Stewart 1991, Stewart and Stark 1988, Baumann *et al.* 1977).

Two species of *Alloperla* are recorded from Illinois (Harris and Webb 1995). *Alloperla caudata* Frison occurs in southern Illinois across the Shawnee Hills (Webb and Harris 1993) and was collected by ultraviolet light traps and sweeping of herbaceous and woody vegetation alongside small gravel streams. The second species, *A. roberti*, is known from northwestern Illinois, in the vicinity of Rock Island. Several trips have been made to Rock Island over the past seven years to collect stoneflies in the Rock and Mississippi Rivers and their tributaries, but no concerted effort to locate *A. roberti* has been conducted by the authors, or other researchers, up to this time.

An extensive resurvey for stoneflies in Illinois has been ongoing for seven years. This effort will redefine the distributions and abundance of the 64 currently know species and contribute to the establishment of an imperilment status for all Illinois species (Webb and Harris 1993). The INHS

maintains the most extensive historical collection of stoneflies in North America. Frison (1929, 1935, 1937, 1942) conducted the herculean task of surveying the stoneflies of Illinois. He was responsible for the original descriptions of a large proportion of the North American stonefly species known today. Ross and Ricker also contributed to the knowledge of Illinois stoneflies and those throughout the continent due to their biogeographic and systematic studies of “winter” species from 1960 through 1970 (Ricker and Ross 1968, 1969; Ross and Ricker 1971). The INHS maintains the specimens collected from all studies of its researchers. This historical resource is unique, since it was assembled before most of the major degradation of Illinois streams took place. A computer database catalogues our stonefly holdings (>18,200 records) and facilitates data recapture and distribution.

Methods

We conducted three extended trips to northwestern Illinois on May 12-15, June 17-19, and July 15-17, 1997. The distribution of the 43 sites across five Illinois counties are presented in Fig. 1. These sites were generally small streams running off the bluffs of the Mississippi and Rock Rivers. Most were similar to the published habitats of *Alloperla* spp. throughout the continent. The uncertainty inherent in Walsh’s label data for the two *A. roberti* specimens necessitated that we also search medium-to-large rivers. These included the Rock, Mississippi, Apple, Galena, and Sinsinawa Rivers. The number of sites visited during each month diminished since some streams became intermittent, or completely dry (see Table 1 for distribution of sites visited by month). Streams that had not supported any stonefly species the previous month were discarded. A few additional sites were added in June and July as new, high quality sites were discovered.

We swept adults from streamside vegetation during the daytime and ultraviolet light trapped them at night. Nymphs were hand-picked from kicknet collections of all discernible habitats and reared to adulthood in styrofoam cups and stream water. Well-conditioned leaves provided a food source, and approximate natural temperature and photoperiod were maintained in an environmental chamber. Reared adults permitted positive identification to the species level. Laboratory technicians sorted all species into separate vials and placed detailed labels inside. Identification was to the species level, except in the case of nymphs of *Amphinemura* sp., which cannot be reliably placed. All specimens reside in INHS collections and have been accessioned into our Plecoptera database.

Results

Disappointedly, we report that no specimens of *Alloperla roberti* were collected during this study. However, six other stoneflies species including *Amphinemura delosa* (Frison), *A. varshava* (Frison), *Clioperla clio* (Newman), *Isoperla bilineata* (Say), *Nemoura trispinosa*

Claassen, and *Perlesta decipiens* (Walsh) were found (Table 1). The following is a brief habitat description of each site visited during the study.

Collecting Sites

1. Illinois, Rock Island County, unnamed tributary of Zuma Creek, 4.2 km SSE Rapids City. This slowly flowing creek was 1 to 2 m wide and less than 10 cm deep. The bottom substrate consisted principally of sand and gravel, with a small amounts of cobble and a light covering of silt in slack water. Leaf packs and wood debris dams were common. The stream flowed south off a low, wooded hillside and across agricultural land, where it was channelized, before flowing into Zuma Creek (Rock River drainage). A low density population of *Amphinemura* sp. nymphs inhabited this stream. None reared to adulthood to permit species identification.
2. Illinois, Rock Island County, unnamed tributary of Zuma Creek, 4.4 km SE Rapids City. This stream compared well with site 1; however, its substrates were greatly affected by silt deposition. Channelization of its lower course and moderate siltation most probably combined to eliminate stoneflies at this site.
3. Illinois, Rock Island County, Zuma Creek, 7.6 km ESE Rapids City. The mainstem of sites 1 and 2 demonstrated a faster flow, two-to-three times greater discharge, and a much wider and deeper channel. Bottom substrates were much coarser than its tributaries. A moderately thick layer of silt covered all substrates in slow waters. Leaf packs and wood debris dams were again a common feature of the streambed. The steeper wooded hillside provided higher current speeds. Channelization again occurred as the stream entered the Rock River floodplain. No stoneflies were collected at this site.
4. Illinois, Rock Island County, Canoe Creek, 3.9 km SW Hillsdale. This stream resembled Zuma Creek, but was about 2 m wider. Siltation and organic enrichment produced an approximately 5 mm layer of sludge atop nearly all surfaces. This tributary of the Rock River yielded no stoneflies.
5. Illinois, Rock Island County, unnamed tributary of Mississippi River, 1.7 km S Port Byron. This moderately fast stream was 3 to 5 m wide and generally less than 10 cm deep. Bottom substrates consisted predominately of sand, gravel, and cobble. A moderately thick layer of silt covered all substrates in quiet waters. Leafpacks and wood debris dams were common. Though much of the watershed flowed through a steeply wooded hillside, 30 to 40% of the basin drained agricultural or residential lands. No stoneflies were collected at this site.
6. Illinois, Rock Island County, unnamed tributary Mississippi River, 2.5 km NE Hampton. This slowly-to-moderately flowing stream was 1 to 2 m wide and less than 10 cm deep. Substrates consisted primarily of sand and gravel. Thin silt covered substrates in quiet waters only. Wood debris and leafpacks were common, since the stream flowed through a heavily-wooded bluff. *Amphinemura delosa*, *A. varshava*, and *Isoperla bilineata* were collected here.

The latter is a big rivers species (Stewart and Stark 1988) and flew in from the Mississippi River. The stream dried completely in July.

7. Illinois, Henry County, Mud Creek, 2 km SSE Green Rock. Mud Creek flowed slowly across old field, pasture, and agricultural lands to its confluence with the Rock River. The bed was 4 to 6 m wide with one extensive riffle near US Route 6. Riffle substrates were principally gravel and cobble. Extremely soft sand and silt predominated upstream of the riffle. Considerable silt covered all substrates in all but the swiftest of water. Leafpacks and wood were uncommon in the vicinity of the riffle. *Amphinemura varshava* occurred abundantly at this site.
8. Illinois, Henry County, Turner Creek, 1.8 km S Green Rock. This tributary of the Rock River greatly resembled Mud Creek, but there were some notable exceptions. Substrates were less silted and leafpacks and wood debris dams were more common. The headwaters were also more densely wooded. No stoneflies were collected at this site.
9. Illinois, Henry County, Mosquito Creek, 6.8 km S Green Rock. This slowly-flowing tributary of the Rock River was 3 to 4 m wide. Bottom substrates were principally sand and gravel, but hardpan clay covered large portions of the streambed in some locations. Densely wooded hillsides provided abundant leafpacks and wood debris. The headwaters of this stream were largely agricultural. A small municipal sewage treatment facility provided much of base flow during dry summer months. No stoneflies were collected at this site.
10. Illinois, Henry County, Schaffer Creek, 3.3 km S Green Rock. This slow-to-moderately swift stream flowed through a narrowly wooded ravine before entering the Rock River. Row crops and pasture were common land uses beyond the wooded riparian zone. The bed width was less than 3 to 4 m wide. Bottom substrates were largely sand and gravel. A slight dusting of silt covered these substrates in quiet waters. Wood debris were common. We collected no stoneflies at this site.
11. Illinois, Henry County, unnamed tributary Rock River, 4.7 km SW Green Rock. This stream flowed moderately fast, was 1 to 2 m wide, and less than 20 cm deep, even in the pools. Bottom substrates were principally sand, gravel, and cobble with a light covering of silt. Most larger substrates were the result of road building and erosion control activities along US Route 6. The local watershed consisted of a steeply-wooded ravine that changed to residential property at the highway. The bluff top supported a golf course and country club grounds. Nymphs of *Amphinemura* sp. were abundant in May. Most reared to *A. varshava*; however, a few adult *A. delosa* were swept from streamside vegetation in June. The stream dried to pools by July.
12. Illinois, Rock Island County, Coal Creek, 0.6 km SW Coal Valley. This moderately-flowing tributary of the Rock River was 4 to 6 m wide. Its bottom substrates consisted of coarser

- gravel, cobble, boulders, and bedrock. A light covering of silt and scattered leafpacks and wood debris dams were present. No stoneflies were collected at this site.
13. Illinois, Rock Island County, unnamed tributary Rock River, 4.3 km E Ginger Hill. This seepage stream flowed through a heavily-wooded ravine that reached 1 to 2 m width, and was never more than 10 cm deep at any time. Sand was the dominant substrate, but gravel and cobble were also present at riffles. Silt lightly covered all substrates. Wood debris and leafpacks were common. Many adults of *A. varshava* were collected in May, while a few *A. delosa* appeared in June. This stream was completely dry in July.
 14. Illinois, Rock Island County, Case Creek, 2.8 km E Ginger Hill. This tributary of the Rock River flowed moderately fast and was 5 to 7 m wide. Approximately 70% of all substrates were sand and gravel. A light coating of silt covered these in quiet waters. Wood and leaves were abundant in the streambed. Land use in the area consisted of forest, agriculture, and residential uses in nearly equal proportion. *Amphinemura varshava* and *P. decipiens* were collected at this site.
 15. Illinois, Rock Island County, Rock River, Vandruff Island, Rock Island. This large tributary of the Mississippi River was >100 m wide where sampled. Sand was the predominant substrate. The watershed was dominated by agriculture upstream and by urban sprawl at the island. *Isoperla bilineata* was abundant at this site.
 16. Illinois, Rock Island County, Big Branch of George Lake, 7.8 km WSW Andalusia. This tributary of the Mississippi River was a reference quality bluff stream. It formed a 4 to 6 m wide channel with sequences of riffles and pools that maintained a moderately fast flow. Riffle substrates were dominated by sand, gravel, and cobble, while pools were of packed sand. Silt lightly covered these substrates in quiet waters. Leafpacks and woody debris were common near riffles. Local landuse was predominantly old field, second growth woods, and cattle pasture. *Amphinemura varshava* was the only stonefly collected at this site.
 17. Illinois, Rock Island County, unnamed tributary of the Mississippi River, 5 km NE of Illinois City. This 3 to 4 m wide, moderately flowing stream had substrates dominated by equal amounts of sand and gravel and minor proportions of cobble and boulder. Very little silt was present. Accumulation of leaves and wood provided additional habitat and food for stream invertebrates. Most of the watershed drained a steeply wooded hillside, but the lower portion drained a small horse pasture. This situation seem to have no effect on stream health since four stonefly species, *A. delosa*, *A. varshava*, *C. clio*, and *P. decipiens* were collected at this site.
 18. Illinois, Rock Island County, unnamed tributary of Mississippi River, 2.6 km W of Illinois City. This 1 m wide, slowly flowing creek, had a bottom composition of sand, gravel, and a low proportion of cobble. Small amounts of ferrous oxide were evident, indicating that seepage from acid springs entered the stream. The stream flowed from a gently sloping,

wooded hillside through a forest opening where stands of willow (*Salix* sp.) entrained sticks and leaves. This stream dried to small, isolated pools in July. *Amphinemura delosa* and *A. varshava* were collected at this site.

19. Illinois, Rock Island County, unnamed tributary of Mississippi River, 4 km WNW of Illinois City. This was a moderately flowing, 3 to 4 m wide stream. Mineral substrates were principally sand and gravel, but cobbles and boulders contributed an estimated 30% of the substrate volume. Silt was not common here. The stream apparently received little nutrients as evidenced by the lack of algal growth and a depauperate macroinvertebrate community. Leafpacks and wood were common in the streambed. Nearly the entire drainage was heavily wooded. No water remained in the channel by July. *Amphinemura varshava* was found in exceedingly low numbers during the May visit.
20. Illinois, Rock Island County, unnamed tributary of Mississippi River 7 km WNW Illinois City. The streambed was almost exclusively a very fine, highly erodible sand. It flowed slowly off a heavily wooded hillside to form a 1 to 2 m wide, shallow channel. Leafpacks and wood debris in this stream were uncommon due to burial by shifting sand substrates. No stoneflies were collected at this site.
21. Illinois, Whiteside County, unnamed tributary of Mississippi River, 2.7 km SSW of Cordova. This was a rapidly flowing stream that was 4 to 7 m wide, and was the only stream encountered with large areas of exposed bedrock (limestone). Despite issuing from a steep and heavily wooded ravine, the stream appeared enriched. Thick growths of green and blue green algae covered all hard substrates, and large populations of mayflies and caddisflies occurred there. Siltation was minor. No stoneflies were collected at this site.
22. Illinois, Whiteside County, unnamed tributary of Otter Creek, 5.2 km SE of Thomson. This small organic stream (1-2 m wide) rarely exceeded 10 cm depth. Sand dominated the bottom substrates, but small amounts of gravel and cobble occurred at the riffles. A thin layer of silt covered all substrates in quiet water. Wood debris and leafpacks were commonly present. The watershed was a mosaic of wooded plateau, cattle pasture, and row crops. Otter Creek is a tributary of the Mississippi River. No stoneflies were collected at this site.
23. Illinois, Carroll County, unnamed tributary of Mississippi River, 3.7 km N of Savanna in Mississippi Palisades State Park. This creek formed in a steep, heavily-wooded ravine. Most often it was <1 m wide and only 1 to 2 cm deep. Gravel and cobble dominated the substrate composition. Organic muck encroached the stream margins due to the locally abundant leafpack and wood debris. Both *A. delosa* and *A. varshava* were collected at this site.
24. Illinois, Carroll County, unnamed tributary of Mississippi River, 6 km N of Savanna, Mississippi Palisades State Park. Nearly the entire volume of this moderately flowing, 1-2 m wide stream was contributed by spring flow. Bottom substrates consisted of a relatively even

distribution of sand, gravel, and cobble, with occasional boulders. Silt on these substrates was almost nonexistent. Ample scattered packs of sticks and leaves provided food and shelter for a large variety of aquatic organisms. This stream coalesced from several rills running through wooded hillsides upstream and open camping areas downstream. *Amphinemura delosa* and *N. trispinosa* were collected at this site.

25. Illinois, Carroll County, Sorrel Horse Camp Spring (recently renamed Turkey Valley Youth Group Camp), Mississippi Palisades State Park; 5.4 km SE Blackhawk. This springhead (protected by a small shed) produced a springbrook <1 m wide and < 10 cm deep of clear, cold water. The principal bottom substrates were gravel, followed by sand and cobble. The springbrook was nearly overgrown by water cress, *Nasturtium officinale* R. Br., nearest the springhead. The entire drainage was nestled in a shallow ravine supporting an old orchard and grass wetland. Leafpacks and wood debris were not so common here due to the open nature of the drainage. The springbrook is an unnamed tributary of Mill Hollow Creek, which flowed into the Mississippi River. *Amphinemura* sp. nymphs (reared by never transformed to adult) and *N. trispinosa* were collected at this site.
26. Illinois, Carroll County, Nadig Spring, 7.6 km SE of Blackhawk. This springboil issued from the base of a nearly 60 m high limestone bluff to produce a swiftly flowing springbrook, 1-2 m wide and <10 cm deep throughout. Bottom substrates were typically coarse with gravel, cobbles, and boulders providing an estimated 60% of the substrate volume. Leafpacks and wood debris were commonly present. Water cress line the lower reaches of the springbrook. The springbrook is an unnamed tributary of Mill Hollow Creek. *Amphinemura delosa* and *N. trispinosa* were collected from this spring.
27. Illinois, Carroll County, Mill Hollow Creek below Nadig Spring, 7.6 km SE Blackhawk. This creek was usually <2 m wide with substrate characteristics similar to Nadig Spring and brook. Water cress line the lower reaches of the springbrook. Its drainage was several km long through old field and pasture. *Amphinemura delosa*, *A. varshava* and *N. trispinosa* were collected at this site.
28. Illinois, Jo Daviess County, Robert's Springbrook, 4.2 km ENE of Blackhawk. Access to this site could not be gained until our July trip. It was a small (1 to 2 m wide), moderately swift springbrook that issued from >5 springheads throughout its watershed. Coarse substrates predominated with gravel and cobble contributing 70% of the estimated substrate volume. Siltation was almost nonexistent. Steeply wooded hillsides characterized nearly the entire watershed. This provided abundant leafpacks and wood debris in the stream channel. *Amphinemura delosa* was the only stonefly collected at this site, but we believe that it was only because of our late season arrival that more were not found.

29. Illinois, Jo Daviess County, unnamed tributary of Mississippi River, 2.8 km WSW of Hanover. This meandering, moderately swift stream flowed through a low wooded hillside into cattle pasture and scrub timber. The principal substrate was sand in this <2 m wide creek. Scattered packs of sticks and leaves were abundantly present, providing appropriate habitat for *A. delosa*, *A. varshava*, and *N. trispinosa* which were all present in low densities.
30. Illinois, Jo Daviess County, unnamed tributary of Mississippi River, 3.4 km W of Hanover. A largely open canopy characterized this small (1 to 2 m wide) meandering, moderately swift creek. A moderate layer of silt covered and embedded the sand and gravel substrates. Leafpacks and wood debris were less common than at site 29 because of its open nature. Cattle pasture, forest, and row cropping were the dominant land uses in the area. *Amphinemura delosa*, *A. varshava* and *N. trispinosa* were collected at this site.
31. Illinois, Jo Daviess County, unnamed tributary Mississippi River in Beaty Hollow, 7.7 km NW of Hanover. This small stream was 3 to 5 m wide and had a moderately swift flow. Sand, gravel, and cobble were the principal substrates, but these were embedded with large amounts of silt due to local row cropping that occurred within 20 m of the stream. Leafpacks and debris dams were common. *Amphinemura delosa*, *C. clio* and *N. trispinosa* were collected at this site.
32. Illinois, Jo Daviess County, unnamed tributary Mississippi River, 6.4 km N of Blanding. This was a moderately swift stream that was 1 to 2 m wide. Sand and gravel were the predominant substrates. A moderate covering of silt occurred in quiet waters. Debris dams and leafpacks were common. *Amphinemura delosa* occurred at this site.
33. Illinois, Jo Daviess County, unnamed tributary of Apple River, 9.2 km NW of Elizabeth, Tapley Woods State Nature Preserve, NE of US-20. This springbrook was added to our collection regime in June. Its course was 1 to 2 m wide and issued from several small springheads along its approximated 1 km reach. The watershed consisted entirely of a heavily wooded, mature forest that provided abundant leaves and wood in the stream. Substrates were relatively coarse with gravel, sand, and cobble contributing over 80% of all substrate volume. Siltation was nearly nonexistent. This was one of the most natural springbrooks sampled throughout the entire project. Both *A. delosa* and *A. varshava* were collected at this site.
34. Illinois, Jo Daviess County, unnamed tributary of Apple River, SW of US-20, adjacent to Tapley Woods State Nature Preserve, 8.5 km NW of Elizabeth. This site was little more than an organic seep and was never wider than 1 m. It drained a heavily wooded ravine upstream, but opened into pasture in its lower reaches. The bottom substrate was principally sand and gravel. Organic muck encroached from the margin. Leafpacks and wood debris were very common, especially in the upper reaches. *Amphinemura varshava* and *N. trispinosa* were collected at this site.

35. Illinois, Jo Daviess County, unnamed tributary Apple River, SW of US-20 adjacent to Tapley Woods State Nature Preserve, 9.2 km NW of Elizabeth. This was similar in most respects to site 33, except that only its headwaters were well forested. Downstream reached flowed through sparsely used cattle pasture. *Amphinemura delosa* and *N. trispinosa* were collected at this site.
36. Illinois, Jo Daviess County, unnamed tributary of Mississippi River, 3.1 km SW of Galena. This stream had a moderately swift flow through its 2 to 4 m wide channel. Coarse substrates dominated, but all of them were covered with a thick layer of silt. The watershed was mostly heavily grazed cattle pasture. Organic debris were difficult to find because no natural riparian vegetation (trees) remained throughout most of the basin. Not surprisingly, no stoneflies were collected at this site.
37. Illinois, Jo Daviess County, Sinsinawa River at US-20, 7.0 km NW of Galena. This was a fast flowing creek, approximately 30 to 40 m wide and up to 1 to 2 m deep in pools. Bottom substrate were exceedingly coarse in the sample location, with large gravel and cobbles being common. A moderate covering of silt occurred over these substrates in quiet waters. Large logjams and leafpacks occurred in the reach investigated. It flowed mainly through pasture and agricultural land. No stoneflies were collected at this site.
38. Illinois, Jo Daviess County, Sinsinawa River, 8.4 km NNW of Galena. This reach of the river was only 10 to 20 m wide, but had the same coarse substrate as found downstream. Sludge of algae and silt covered most surfaces, even in moderately fast flows. Cattle grazing was the predominant land use in the area. Ranchers allowed cattle free access to all banks, as evidenced by their broken nature throughout the study reach. No stoneflies were collected.
39. Illinois, Jo Daviess County, Galena River, 3.6 km WNW of Council Hill. This site was very similar to site 38 in substrate and landuse characteristics. *Perlesta decipiens* was the only stonefly species collected.
40. Illinois, Jo Daviess County, unnamed tributary of Mill Creek, 1.8 km W of Schapville. This springbrook maintained a moderately swift flow in its 1 to 2 m wide channel throughout the summer. Substrates were and even mix of sand, gravel, and cobble, with only a light covering of silt. The watershed was mostly hayfield and cattle pasture which did not provide material for leafpacks and wood debris. Even so, large numbers of *A. varshava* and a few *A. delosa* occurred at this site.
41. Illinois, Jo Daviess County, Mill Creek, 1.0 km E of Schapville. This stream maintained a moderate flow throughout the summer. Its channel was 5 to 7 m wide with bottom substrates principally of gravel and sand. Silt moderately covered these substrates at riffles, but deep deposits were present in the pools. Leafpacks and wood debris were abundant. Landuse in the area consisted mainly of row crops and pasture, but a 5-10 m wide tree-lined riparian zone

- existed. A low population density of *Amphinemura* sp. nymphs (rearing attempted but failed) and large numbers of *Perlesta decipiens* occurred at this site.
42. Illinois, Jo Daviess County, Coon Creek at Canyon Camp BSA, 8.0 km SW of Millville. This moderately swift tributary of the Apple River was 4 to 6 m wide. Gravel and sand dominated bottom substrates. Siltation was minor. Leafpacks and wood debris were common due to the watershed being nearly completely forested. One specimen of *Amphinemura* sp. (rearing attempted but failed) was collected at this site.
43. Illinois, Jo Daviess County, South Fork of the Apple River, Apple River Canyon State Park, Millville. This was a swiftly flowing stream, 15 to 20 m wide and >1 meter deep in some pools. Bottom substrates were coarse in this reach, being dominated by gravel and cobble. A thin layer of sludge, consisting of algae and silt, covered most surfaces. The stream flowed through a narrow canyon that was steeply wooded hillsides, but landuse on the bluffs above consisted of row cropping. A single nymph of *Amphinemura* sp. was collected here.

Discussion and Conclusions

Efforts to recollect *A. roberti* prior to this study have focused on the “Rock Island, Illinois” type locality. The lack of a more specific locality and time frame for Walsh’s original collection has most certainly hampered the effort to recollect it. It is indeed difficult to imagine with all the work conducted by Frison between 1920 and 1940 in the Rock River drainage that no additional specimens were found. It is possible that most collectors assumed that the species resided in the Rock River mainstem. However, collections of *Alloperla* sp. throughout the Nearctic realm most often come from small-to-medium-sized streams (see Stewart and Stark 1998 for a summary of the genus as known through 1987). *Alloperla caudata* occurs in southern Illinois in just such habitats (Harris and Webb 1995, Webb and Harris 1993).

Our concentrated effort to relocate this species centered on the smaller streams draining bluffs above the Mississippi and Rock Rivers, in northwestern Illinois. Additional larger rivers such as the Rock, Mississippi, Galena, Apple, and Sinsinawa Rivers also were surveyed. Our search, though it covered all months when adults of other *Alloperla* species are present and being centered on the best remaining habitat in that portion of the state, yielded no additional records of *A. roberti*. We believe that this species is extinct, as currently listed by the U. S. Fish and Wildlife Service. Large scale transformation of a once forested bluff and ravine system by logging, mining, row cropping, and cattle pasturing have devastated watersheds in the region. Unfortunately, very little research was done on small streams in that region prior to this degradation. Our computerized stonefly database reveals that Frison and his colleagues did very little collecting in that area, except for in the Rock River mainstem, where they found 18 species throughout its drainage.

The bluff streams we sampled support, in some cases, large populations of several nemourid stoneflies. These were most common in streams that appeared to be of relatively high biotic integrity. *Amphinemura varshava* displayed the widest distribution among stoneflies in this family. They were encountered in large number in streams that had slow to moderate flows, where the principal water source was surface runoff, and were even abundant in situations where siltation was moderate. *Amphinemura delosa* was never very abundant. It occurred sporadically in streams whose flows had a much high proportion of their volume from spring flow. They were most often found in streams that were perennial and cool. *Nemoura trispinosa* seemed to be the most sensitive of the three, occurring in the greatest abundance at springheads and their springbrooks. Only occasionally did we find them away from this habitat, and never abundantly so. *Clioperla clio*, a fairly sensitive perlotid stonefly was found in only a few locations, where spring flow provided much of the water. Two other stoneflies, the perlid, *P. decipiens*, and the perlotid, *I. bilineata*, most often occurred in small-to-medium and large rivers, respectively. Both are most at home in sandy substrates and can tolerate a wide range of stream qualities. Case and Mill Creeks, and the Galena River were silty, mineral and organically enriched waterbodies away from the bluffs. They supported *P. decipiens*. The Rock and Mississippi Rivers, both enriched waterbodies, supported large populations of the *I. bilineata*.

Acknowledgements

Appreciation is extended to the Division of Natural Heritage, Illinois Department of Natural Resources and the Canon Exploration Grant Program of The Nature Conservancy for funding this research. L. Peraino, B. Hernandez, L. Lopez, P. Li, and D. Duong helped with fieldwork and laboratory preparation of specimens. The Illinois Natural History Survey and University of Illinois provided facilities for our work. Gratitude is extended to B. Handel (INHS) for locations of some high quality stream sites and to D. Roberts for granting permission to investigate a stream on his property. K. Hunter (INHS) produced the map of sample locations.

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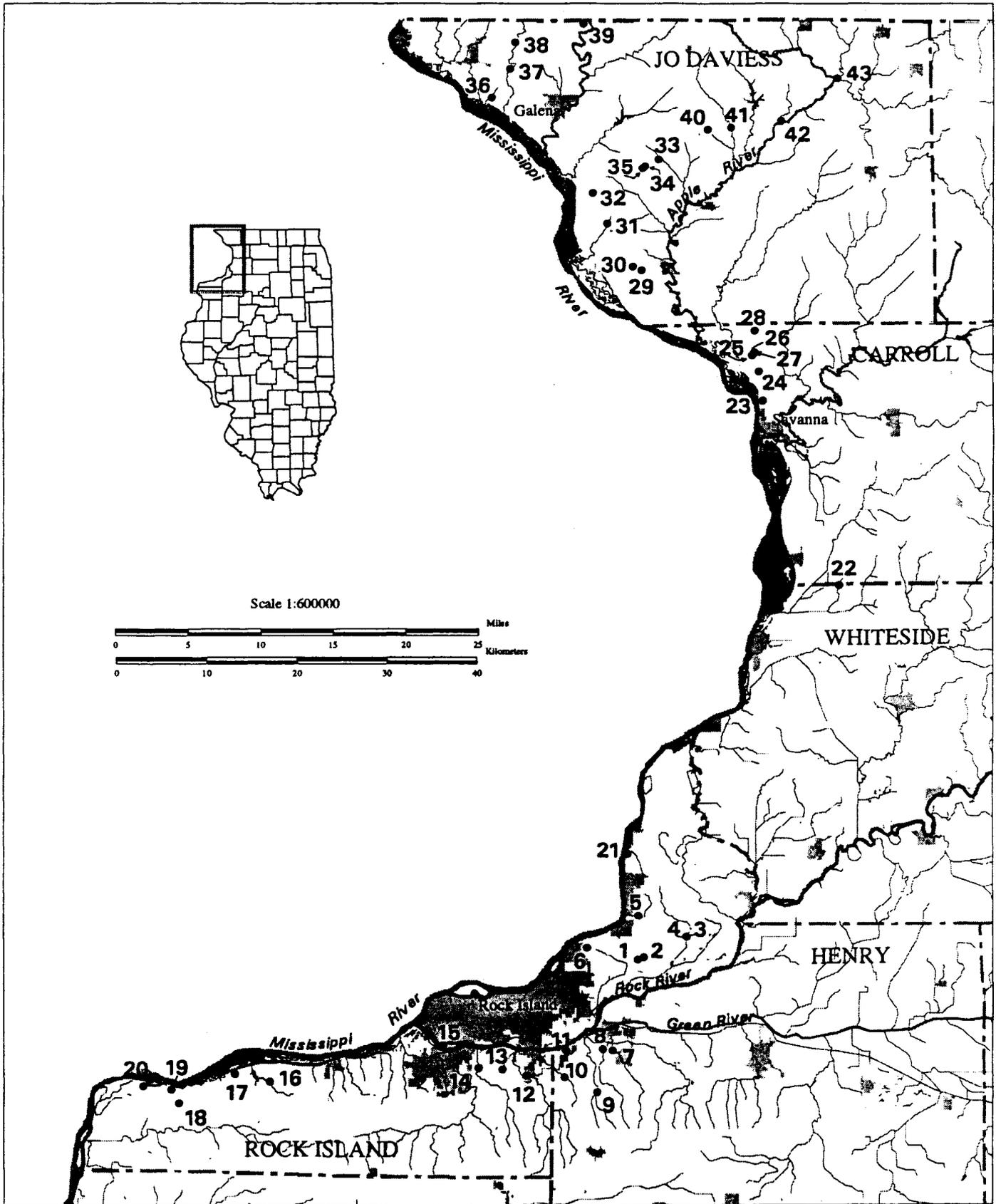


Fig. 1. Sites searched for the federally-listed extinct, Illinois endemic stonefly, *Alloperla roberti* Surdick, in northwest Illinois streams. Survey conducted by the INHS May through July, 1997. Please refer to the text for localities and stonefly species occurrence for each site.

Table 1. Sampling locations, dates sampled, and species found in northwest Illinois, Mississippi River and Rock River bluff areas. NT=*Nemoura trispinosa*, AD=*Amphinemura delosa*, AV=*Amphinemura varshava*, AM = *Amphinemura* sp. nymph, PD=*Perlesta decipiens*, CC=*Clioperla clio*, IB=*Isoperla bilineata*.

| Sites | Months Visited | | | Stonefly Species Encountered | | | | | | |
|-------|----------------|------|-------|------------------------------|----|----|----|----|----|----|
| | May | June | July | NT | AD | AV | AM | PD | CC | IB |
| 1 | X | X | X | | | | X | | | |
| 2 | X | | | | | | | | | |
| 3 | X | | X | | | | | | | |
| 4 | X | | X | | | | | | | |
| 5 | X | X | X | | | | | | | |
| 6 | X | X | X | | X | X | | | | X |
| 7 | X | X | X | | | X | | | | |
| 8 | X | X | X | | | | | | | |
| 9 | X | X | X | | | | | | | |
| 10 | X | X | X | | | | | | | |
| 11 | X | X | X dry | | X | X | | | | |
| 12 | X | X | | | | | | | | |
| 13 | X | X | X dry | | X | X | | | | |
| 14 | X | X | X | | | X | | X | | |
| 15 | X | X | X | | | | | | | X |
| 16 | X | X | X | | | X | | | | |
| 17 | X | X | X | | X | X | | X | X | |
| 18 | X | X | X dry | | X | X | | | | |
| 19 | X | X | X dry | | | X | | | | |
| 20 | X | X | X | | | | | | | |
| 21 | X | X | X | | | | | | | |
| 22 | X | | | | | | | | | |
| 23 | X | X | X | | X | X | | | | |
| 24 | X | X | X | X | X | | | | | |
| 25 | X | X | X | X | | | X | | | |
| 26 | X | X | X | X | X | | | | | |
| 27 | X | X | X | X | X | X | | | | |
| 28 | | | X | | X | | | | | |
| 29 | X | X | X | X | X | X | | | | |
| 30 | X | X | X | X | X | X | | | | |
| 31 | X | X | X | X | X | | | | X | |
| 32 | X | X | | | X | | | | | |
| 33 | | | X | | X | X | | | | |
| 34 | X | | | X | | X | | | | |
| 35 | X | X | X | X | X | | | | | |
| 36 | X | X | | | | | | | | |
| 37 | X | X | | | | | | | | |
| 38 | | X | | | | | | | | |
| 39 | X | X | | | | | | X | | |
| 40 | X | X | X | | X | X | | | | |
| 41 | X | X | X | | | | X | X | | |
| 42 | X | X | | | | | X | | | |
| 43 | X | | | | | | X | | | |