FOSSIL ARANEOMORPH SPIDERS FROM THE TRIASSIC OF SOUTH AFRICA AND VIRGINIA

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ABSTRACT.   New fossil spiders from Triassic rocks of South Africa and Virginia are described. Though lacking synapomorphies of Araneomorphae, certain features suggest they belong in that infraorder, and possibly in the superfamily Araneoidea. Thus, they represent the oldest known fossil araneomorphs and extend the fossil record of the infraorder by approximately 40 Ma to 225 Ma.

Few Mesozoic spiders have been described. Cretaceous mygalomorphs (Eskov & Zonshtein 1990), orbicularian araneomorphs (Selden 1990; Mesquita 1996) and indeterminable Araneae (Jell & Duncan 1986) have been described; and spiders from the Cretaceous Crato Formation of Brazil (Maisey 1991) and Canadian amber (McAlpine & Martin 1963) are currently being studied by PAS. Jurassic records are equally sparse, consisting of a described archaeid (Eskov 1987), the araneoid *Juraraneus* Eskov 1984, and undescribed filistatids (Eskov 1989). Until now, *Juraraneus* was the oldest known fossil spider which could be considered an araneomorph. Only one Triassic spider, *Rosamygale* Selden & Gall 1992, has been described: it was placed in Hexathelidae and is the earliest mygalomorph. In this paper, two new fossil spiders are described, both from rocks of Triassic age, thus tripling the number of known Triassic spiders. The specimens show features consistent with Araneomorphae (though synapomorphies of that clade are not preserved), and represent the oldest known fossil araneomorphs. Stratigraphy, paleoecology and locality information is provided for the South African spider by JMA and HMA, and for the Virginia specimen by NCF. All other discussion and systematics are the responsibility of PAS.

METHODS

Terminology and abbreviations.—In the specimens studied, the largest movable cuticular processes are termed bristles; they decline in width from base to tip and in this respect they differ from the spines which occur on many spiders which thicken between base and tip. Smaller and thinner cuticular hairs are termed setae. Abbreviations used in the text and figures: I-IV = first to fourth legs, car = carapace, fe = femur, mt = metatarsus, pa = patella, Pd = pedipalp, st = sternum, ta = tarsus, ti = tibia, trich = trichobothrium. All measurements are in mm.

South African specimens.—The specimen from South Africa (Figs. 2–8) was discovered by JMA and very kindly sent to the senior author by HMA. It originates from the Upper Umkomaas locality in the Triassic Molteno Formation at Natal-Kwazulu, South Africa (Anderson & Anderson 1983, 1984). This is the first fossil spider to be found in South Africa. A second specimen of a possible spider, from the Telemachus Spruit locality in the same formation, was discovered recently; but it is less well-preserved and is not described here.

The Molteno Formation (Fig. 1) was deposited in an extensive, intracontinental foreland basin bounded by rising fold mountains to the south and traversed by a system of braided rivers (Cairncross, Anderson & Anderson 1995). It reaches a maximum thickness of about 600 m and the erosional remnant extends over an area roughly 400 km north to
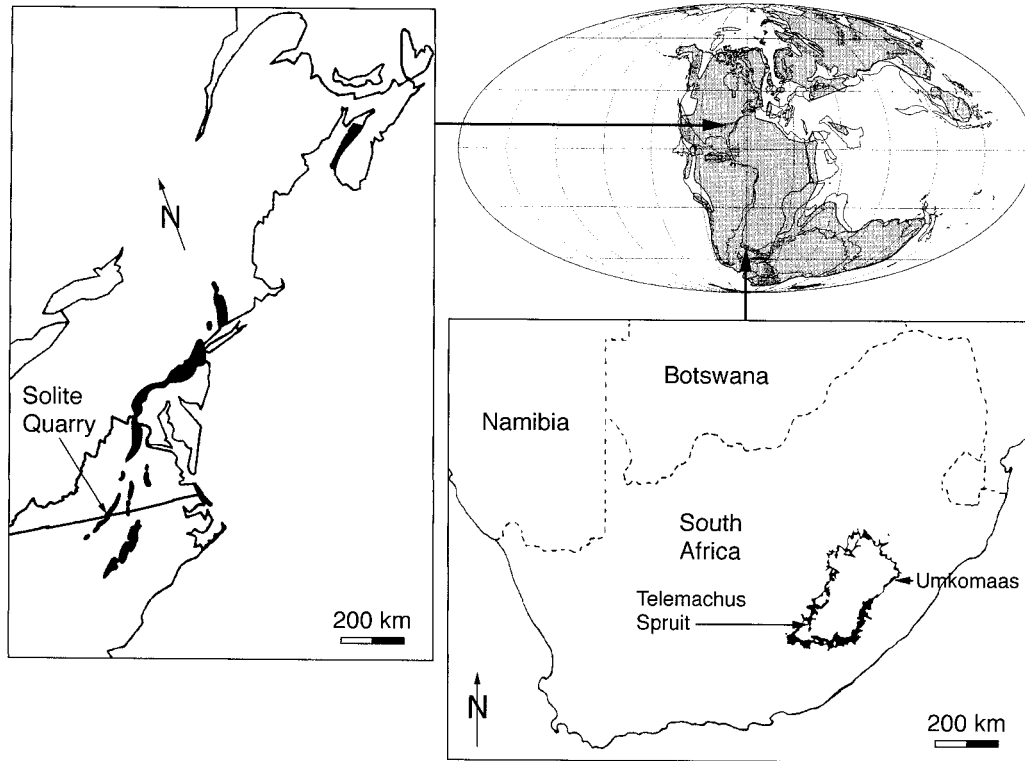
Figure 1.—Location maps of the Solite Quarry, Virginia, in the Danville/Dan River basin (Triassic outcrops shown in black) and localities in the Molteno Formation (shown in black), South Africa, in relation to the late Triassic (~220 Ma) world (land shaded; Triassic outcrops in darker shading). Maps after Anderson et al. 1998; Fraser et al. 1996; Smith et al. 1994.

south and 200 km west to east. The age of the formation is not tightly established, but on the basis of global biostratigraphic correlations (Anderson & Anderson 1983; Anderson et al. 1989) is considered to be Carnian (late Triassic), 222–229 Ma BP. No absolute radiometric ages are available.

A 30-year collecting program (Anderson & Anderson 1983, 1989, 1993a, b; Anderson et al. 1989) has yielded 100 phytotaphocenoses (PTCs, fossil plant assemblages) from the formation. The flora—the richest known globally from the Triassic—includes 56 genera with 204 vegetative species. It is particularly characterized by some 20 species of the seed-fern *Dicroidium* Gothan 1912. There occurs a roughly equal diversity of gymnosperms, including conifers, cycads and ginkgos, along with several new orders, and 'pteridophytes,' primarily horsetails and ferns. Though rare, insects comprise by far the most frequently encountered element of the fauna. A remark-

able diversity of 117 genera and 333 species in 18 orders is provisionally recognized in the over 2000 specimens at hand from 43 of the 100 plant assemblages. The beetles, cockroaches and bugs clearly dominate. Conchostraca, from 20 PTCs, are represented by some 3 genera and 8 species. The remaining fauna is sparse: 3 species of fish (impressions only) from 3 PTCs, 2 species of bivalve from 1 PTC, and the 2 spider specimens documented here. Dinosaur trackways, but no skeletal remains, have been identified at a few (nonplant) sites.

The Upper Umkomaas ('Waterfall') locality: The fossiliferous bed consists of a dark grey, thinly laminated, carbonaceous shale with excellently preserved plant compressions (with cuticle) and rare insects. Exposed in the bed of a small mountain stream, it reaches 2.3 m in thickness and over 10 m in strike. The shale is interpreted as having accumulated in a non-aerated, abandoned river channel. With
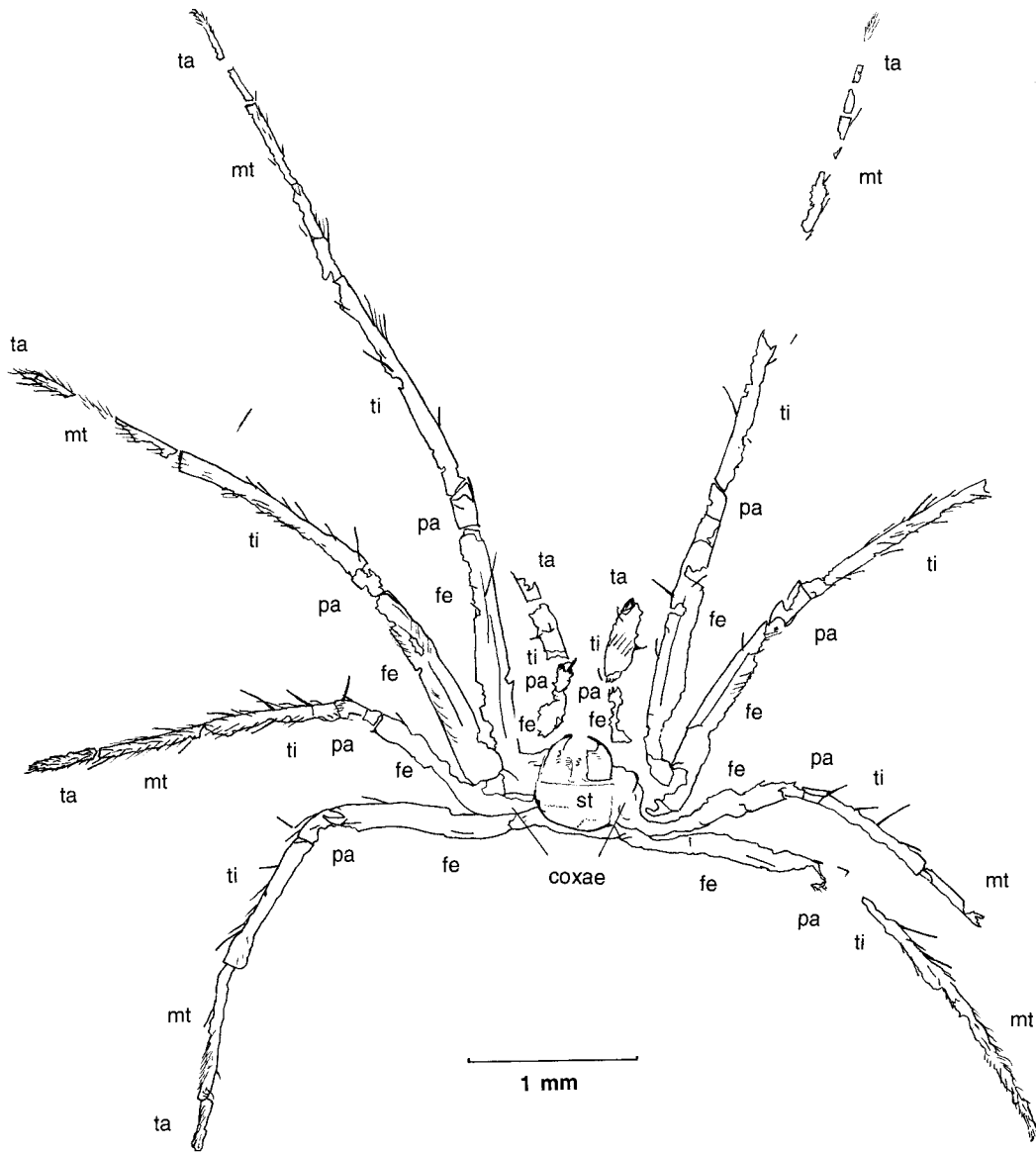
Figure 2.—*Triassaraneus andersonorum* Selden new genus and species, camera lucida drawing of holotype part, PRE/F 18560a, from the Triassic (Carnian) Molteno Formation, South Africa. See Figure 4.

23 genera and 73 species of plant (vegetative taxa), the Umkomaas site has produced by far the richest flora of the 100 Molteno PTCs. The assemlage is seen as representing a dense riverine forest dominated by *Dicroidium*.

The insects from the site, mostly isolated wings and abdomens and—far less commonly—complete adults, now number 166 individuals. The rate of yield is around one specimen per hour when scanning cleaved, bedding plane surfaces under the microscope. The insect fauna is strongly dominated by cockroaches (80 individuals, 4 species), beetles (63 individuals, 28 species) and bugs (12 individuals, 6 species). The remaining fauna consists of some 70 specimens of Conchostraca in 3 species and the single specimen of spider. The extreme rarity of the spider is clearly emphasized when it is considered that we (JMA & HMA) have to date spent 400
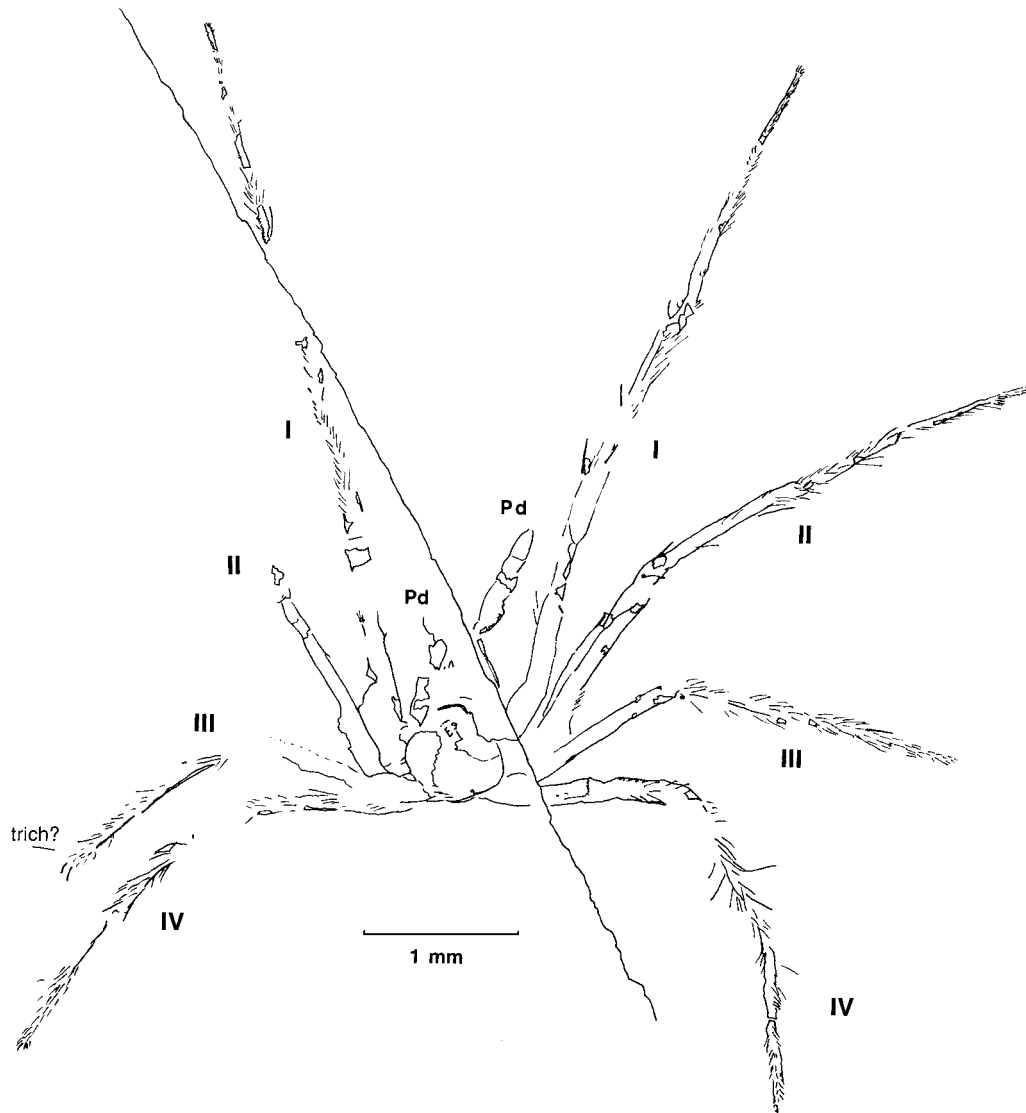
Figure 3.—***Triassaraneus andersonorum*** Selden new genus and species, camera lucida drawing of holotype counterpart, PRE/F 18560b, from the Triassic (Carnian) Molteno Formation, South Africa. See Figure 7.

man-hours cleaving plant-fossiliferous slabs from the Umkomaas site, and that the entire curated collection of 2500 cataloged slabs has been carefully scanned under a binocular microscope.

The Telemachus Spruit locality: This site is somewhat different in character from Upper Umkomaas. The plant-fossiliferous bed, a 10 cm thick, buff mudstone, is exposed along a stream bank over approximately 10 m of strike and is interpreted as an abandoned

channel-fill (Cairncross, Anderson & Anderson 1995). The flora (vegetative) of 12 genera and 19 species is strongly dominated by the single coniferous species *Heidiphyllum elongatum* (Morris 1845) Retallack 1981. The assemblage most likely represents two distinct plant communities: a mono-dominant stand of reed-like conifers colonizing sand bars in the braided river and, from farther afield, a *Dicroidium*-dominated riparian forest occupying the river bank. The insect fauna at this site,

represented by only 17 fragmentary specimens, is dominated, as at Umkomaas, by beetles, cockroaches and bugs. The yield remains at around one individual per man-microscope hour. Conchostracans have not been found. The rarity of the single spider specimen is once again emphasized by the fact that JMA & HMA have spent 90 man-hours cleaving slabs at this site and that all 900 curated and cataloged slabs have been carefully scanned for insects or other faunal elements under the binocular microscope.

Preservation: The Umkomaas specimen is preserved as brown, organic cuticle on a dark grey shale. Superficially, the cuticle appears black; but under ethanol and high magnification the brown color is evident, and the shale appears paler. The shale is splintery, and pieces readily spall away, necessitating care while studying the fossils. Both part and counterpart eventually cracked after hours of study; the crack on the counterpart is shown in Fig. 7. Scattered throughout the shale are abundant plant remains, including leafy shoots (Fig. 4), spores, and unidentified coalified strands.

The legs are outstretched in a relaxed manner, suggesting that the spider died in the water or was carried there soon after death, thus enabling the muscles to relax. The podomeres are flattened by compression of the shale matrix, but there is a little relief in the form of a pair of oval (long axes sagittal) humps in the anterior half of the prosomal body and a wider oval (long axis transverse) area in the posterior part of the prosomal body. These structures occur on the part with equivalent depressions on the counterpart. Lateral to the prosomal body, the areas representing the coxae, trochanters and basal femora of the legs has a stepped appearance, with each leg overlapping the more posterior leg slightly, and with a sliver of matrix between. The fact of the prosomal humps and the overlapping coxae suggest that the part represents the animal viewed lying on its back, presenting its ventral side to view; the counterpart is mainly an external mold of the ventral surface. The humps on the prosomal body thus represent paired palpal endites with chelicerae beneath (as viewed with the spider on its back) and the sternum behind. The numerous sheets of cuticle, some well-sclerotized, at the anterior end of the prosomal body area, and the convexity of the humps, suggest that the chelicerae as

well as the palpal endites are involved here. The detail of preservation is quite extraordinary, although it has been pointed out (Selden 1989) that the fossilization of a spider is a rare event. When one is recognizable to a collector, it usually turns out to be well-preserved; and the stratum from which it came is dubbed a Fossil-Lagerstätte. Under high magnification, long setae are seen to be abundant on the legs, especially on the more distal podomeres. Larger bristles are apparent, too, as well as the paired claws on some tarsi (Fig. 5), and the details of some joint articulations.

Virginia specimen.—The Virginia specimen (Figs. 9–14) was collected by NCF. It originates from the late Triassic (Carnian) of Virginia and is deposited in the Virginia Museum of Natural History, Martinsville, Virginia. Details of the paleoenvironment and associated fauna are given in Fraser et al. (1996). The early Mesozoic rocks of the Newark Supergroup of eastern North America were deposited in a series of rift basins that formed as Pangaea started to separate (Fig. 1). Collectively, the sediments provide a continuous record from the middle Triassic (Anisian) through to the early Jurassic (Hettangian or younger) (Table 1). The sediments are potentially of enormous value in studies of terrestrial faunal and floral change at this crtitical period. However, despite their long-time fame for extensive dinosaur trackways (e.g., Hitchcock 1836a, b, 1858; Lull 1915), documentation of other fossils is extremely limited.

The long (167 km), but exceptionally narrow (3–15 km), Danville/Dan River basin in Virginia and North Carolina is one of the more southern basins (Fig. 1). Trackways have been recorded from a variety of localities in this basin (e.g., Fraser & Olsen 1996); and isolated occurrences of tetrapods, fish and plants have also been reported (Olsen & Gore 1989). By far the most significant and productive locality to date is the Virginia Solite Quarry which straddles the Virginia-North Carolina state line. The sediments exposed at the Solite Quarry are referred to the Cow Branch Formation. Paleomagnetic studies indicate that they are equivalent in age to the Lockatong Formation of the Newark basin, most specifically the Nursery through to the Prahls Island members, with the main insect-producing unit probably age-equivalent with the basal Skunk Hollow member (Kent & Ol-
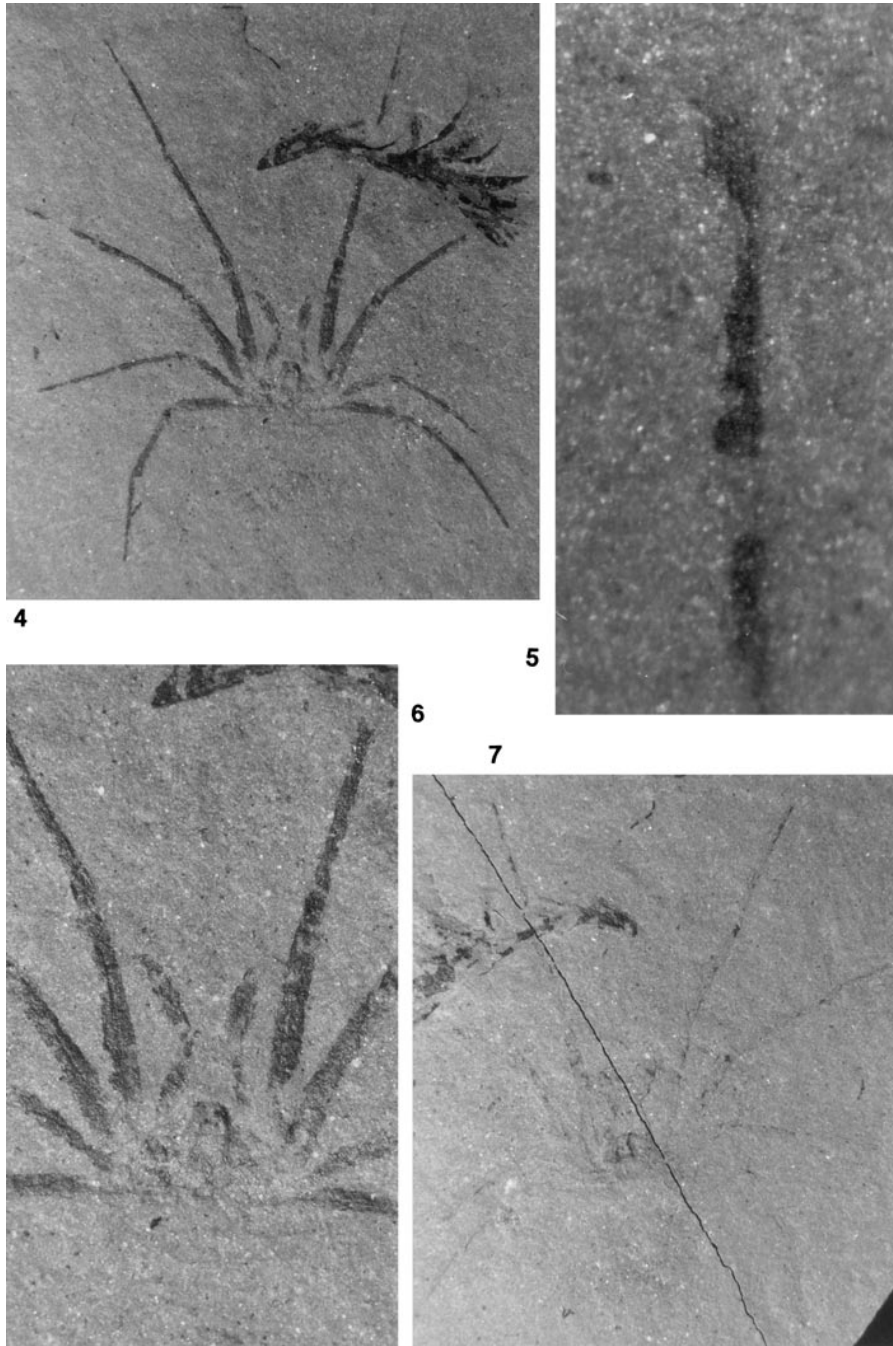
Figures 4–7.—***Triassaraneus andersonorum*** Selden new genus and species, holotype from the Triassic (Carnian) Molteno Formation, South Africa; incident light under ethanol. 4. Whole part, PRE/F 18560a; 5. Detail of tarsus and distal metatarsus of left leg I of part showing general preservation and tarsal claws (top), ×160; 6. Detail of body and proximal podomeres of part, ×24; 7. Whole counterpart, PRE/F 18560b, ×12.

Stratigraphy   North America   South Africa

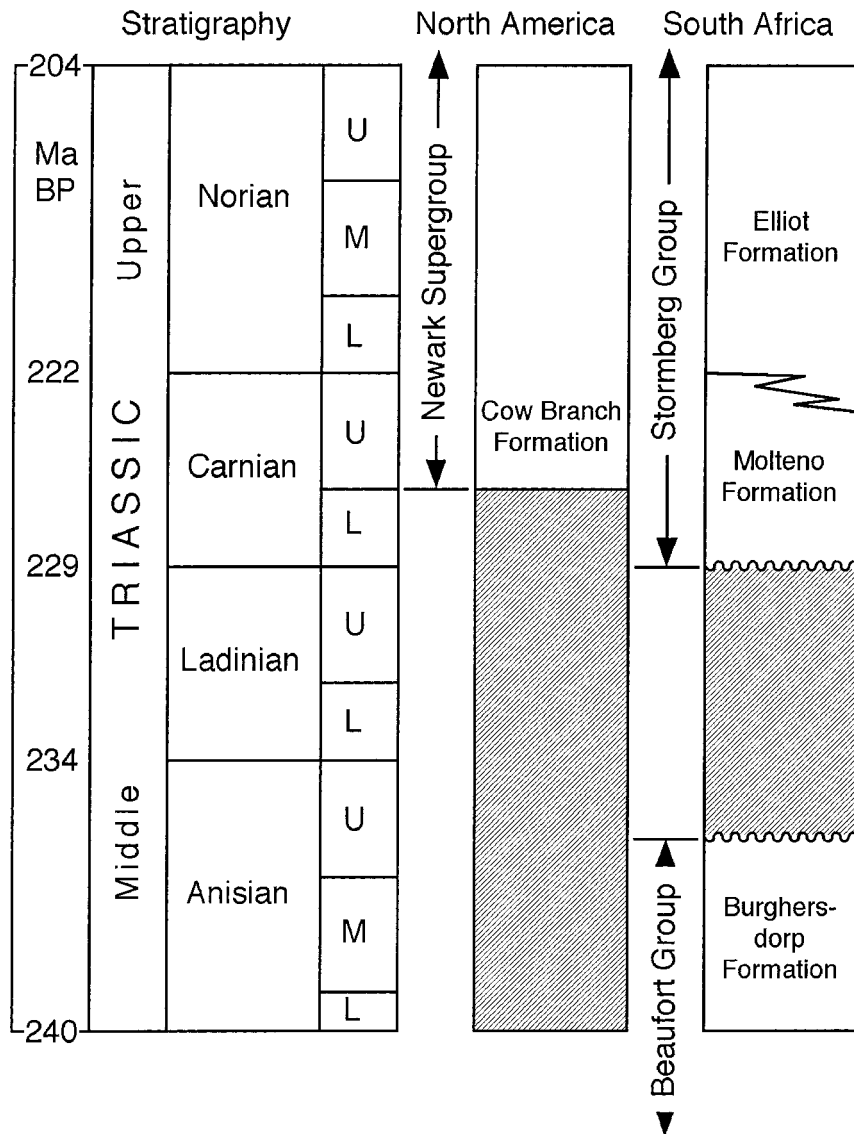|						
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(stratigraphic correlation chart)

Table 1.—Stratigraphic correlation of the Triassic (Carnian) Cow Branch Formation of Virginia and the Molteno Formation of South Africa.

sen 1997). On this evidence, they are late Carnian in age, which is in close agreement with biostratigraphic studies (Olsen & Gore 1989).

Taken together, the three quarries of the Solite Corporation at Cascade expose over 350 m of section. Like other lacustrine rocks of the Newark Supergroup, there is a very clear cyclical pattern of sedimentation which reflects fluctuating lake levels. Typically, each sequence (van Houten cycle) consists of three divisions interpreted as: 1) lake transgression, followed by 2) a high stand, and then 3) a regression and low stand. These fluctuations are attributed to climate changes which affect the rates of inflow and evaporation (van Houten 1964; Olsen 1986). Each cycle is about 20 m thick. Division 3 facies contain footprints (including *Rhynchosauroides*, *Gwyneddichnium*, as well as those of small theropod and ornithischian dinosaurs), and they also yield root traces and foliage fragments. Division 2 facies are the most fossiliferous. In the upper
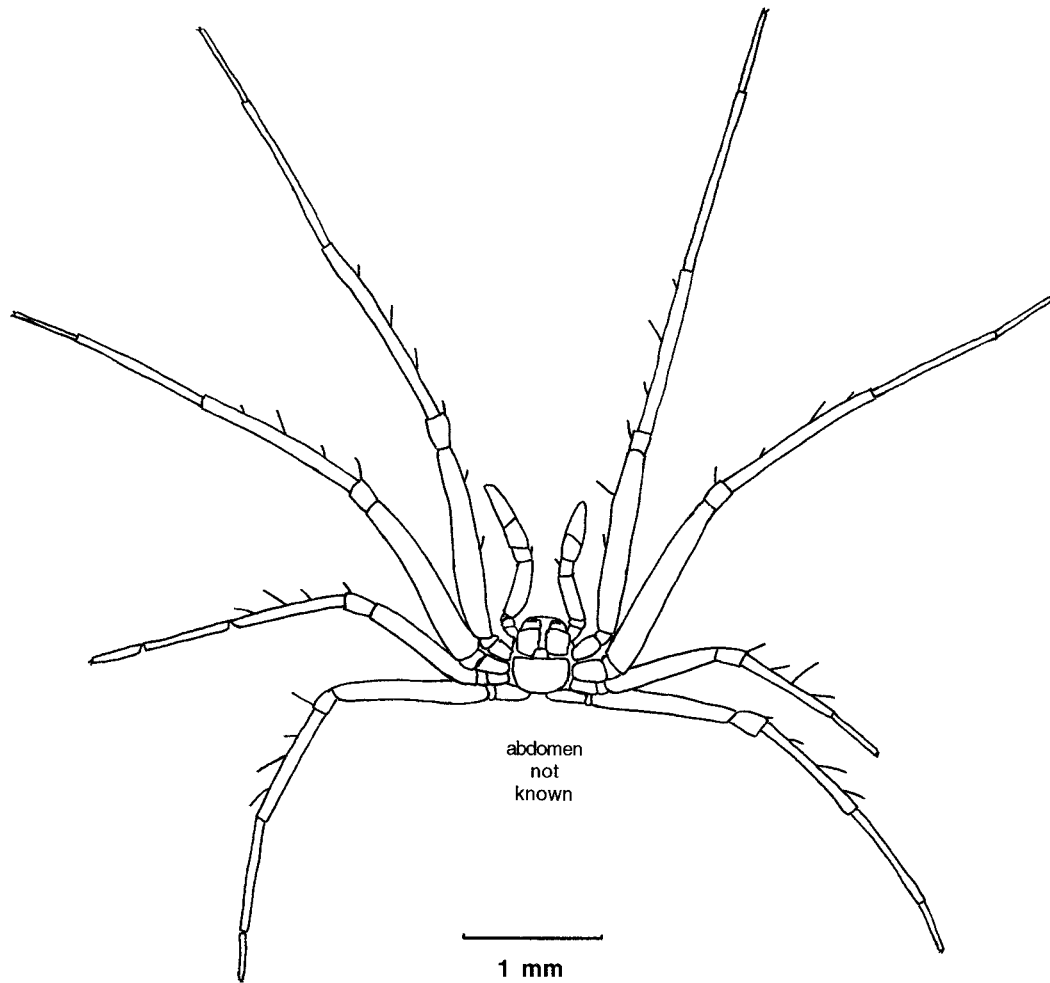
Figure 8.—Reconstruction of *Triassaraneus andersonorum* Selden new genus and species.

portion *Pagiophyllum* and *Brachyphyllum* shoots are common together with cone scales. Towards the base of division 2 diversity levels increase, and there are abundant remains of cycadeoid foliage together with ferns, gymnosperms and occasional ginkgophytes. Vertebrates are also present in these units. Fish are represented by a number of semionotids, redfieldiids, the paleoniscoid *Turseodus* and a coelacanth. The most abundant tetrapod is the prolacertiform *Tanytrachelos*, known from over 200 skeletons. In addition, phytosaurs and a smaller number of other tetrapods are represented by fragmentary remains. The insects occur almost exclusively at the base of division 2. Foliage fragments, particularly of cycadeoids, are fairly common in division 1.

To date, only one area in the quarry has been substantially excavated. In the 1970s, teams from Yale University, under the direction of Paul E. Olson, first realized the potential of the locality and collected over 300 insects from a relatively small (approx. 15 m²) area. This excavation was extended recently by teams from the Virginia Museum of Natural History and Columbia University, but the total area exposed does not exceed 40 m². Most of the time spent in the field is devoted to exposing the fossiliferous units. Once exposed, each man-hour yields, on average, 6 or 7 insects and literally thousands of conchostracans. The cleaved surfaces are scanned in the field using 7× magnification eye visors. The insects are found almost exclusively in two or
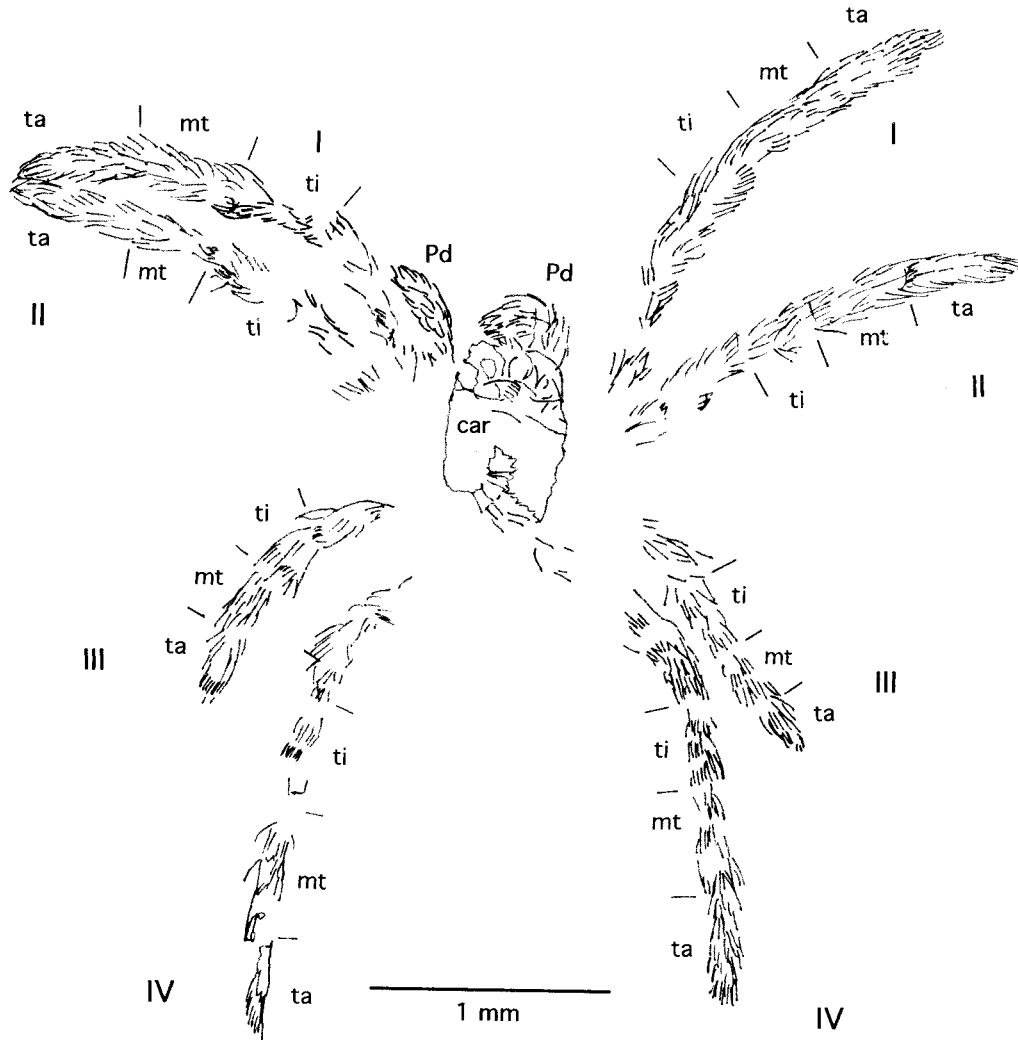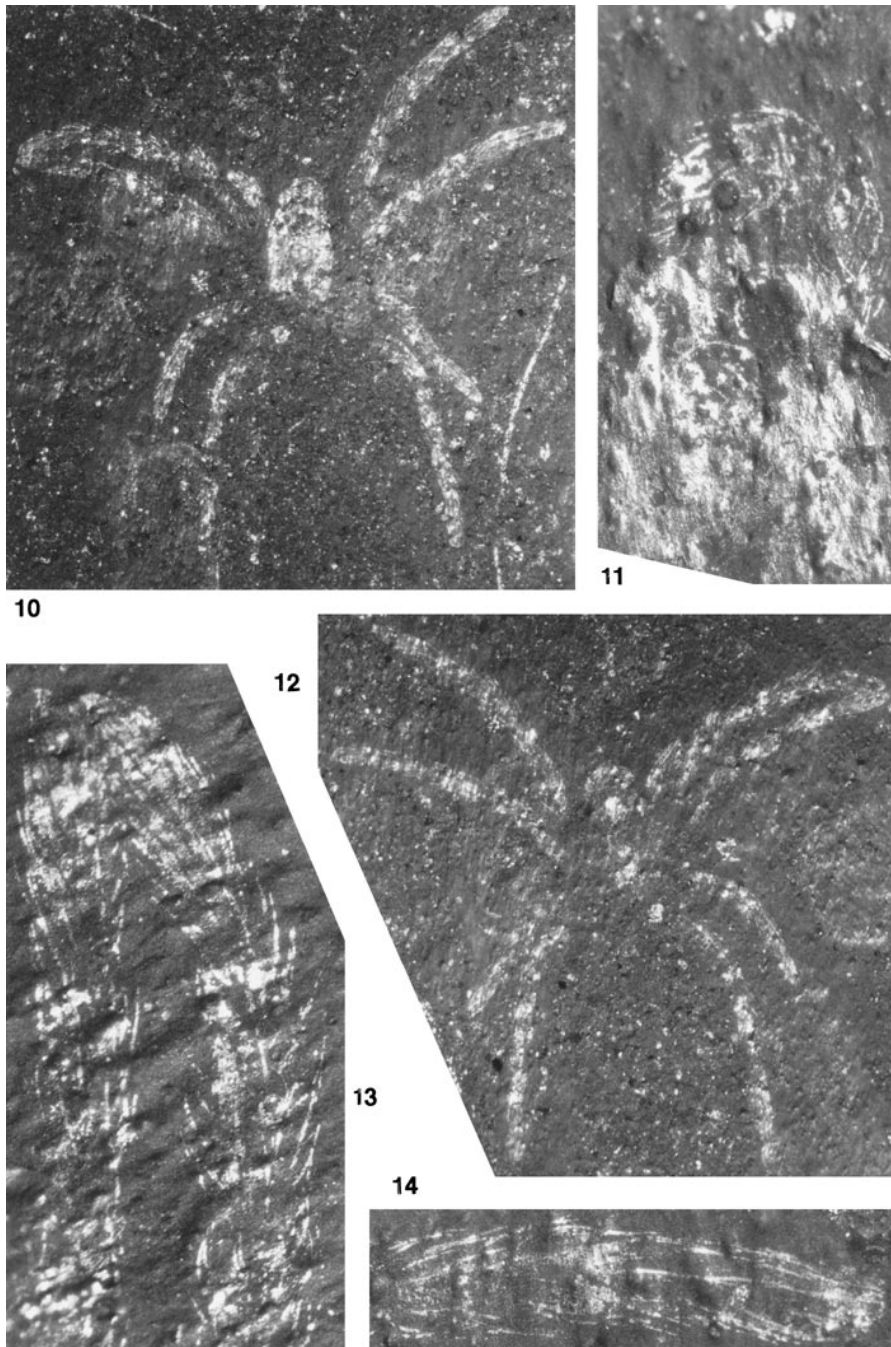
Figure 9.—Camera lucida drawing of ***Argyrarachne solitus*** Selden new genus and species, holotype, VMNH 782, part, from the Triassic (Carnian), Solite Quarry, Cascade, Virginia. See Figure 10.

three discrete, very thin beds—over 95% of the specimens were uncovered from a single 2.5 cm thick unit. The other units produce abundant plant and vertebrate remains and, while they are unlikely to produce insects, an equal portion of the excavation effort has been channeled towards these units. Some 2500 insects had been collected by mid-1997, when a new insect-bearing unit was identified, containing water bugs in exceptionally high densities (1 cm^{-2}). Thus, the numbers of insects recovered from the Solite quarries is expected to increase. The great majority of the insect finds are of complete individuals. By contrast with the large number of insects, only two spiders have been recovered, making them a very rare component of the fauna, as they are in the Molteno assemblages.

Preservation: The specimen is almost certainly a juvenile. An additional specimen of a possible spider from the Solite Quarry has been seen by the author, but it is even smaller and less well preserved than the one described here. If it is a spider, then it is also a juvenile. While there is active collecting at the site, hope remains that further, mature specimens might turn up and allow better description of the species.

Figures 10–14.—***Argyrarachne solitus*** Selden new genus and species, holotype, VMNH 782, from the Triassic (Carnian), Solite Quarry, Cascade, Virginia; incident light under ethanol. 10. Whole part, ×20; 11. Anterior carapace, palpal endites, chelicerae, and right pedipalp of part, details of endites and chelicerae are obscure. Note matrix bubbles due to mineral growth and patches where silvery cuticle is absent, ×85; 12. Whole counterpart, ×20; 13. Detail of distal parts of left legs I and II of part, note fine preservation of setae, dentate tarsal claws, ×100; 14. Detail of tarsus and distal metatarsus of right leg II of part, ×100.

The specimen is preserved, as are the insects in this deposit, as silver streaks on a black matrix. On the same slab are abundant bivalved crustaceans. The matrix is an extremely fine black shale but contains abundant crystals (gypsum?) which form bubbles on the flat surface of the rock and disrupt the specimen in places (Fig. 11). Finding, studying, and photographing the specimen require considerable manipulation of the light source and the use of ethanol to enhance the contrast between silvery streaks and matrix. Nevertheless, very fine details, such as leg setae, can be seen. The carapace and pedipalp endites are preserved as sheets of silvery cuticle. The absence of patches of cuticle in the anterior carapace region gives the appearance of large eyes, but higher magnification (Fig. 11) shows this not to be the case. Patches where cuticle is absent on the part (Fig. 10) can be matched with the presence of cuticle on the counterpart (Fig. 12). The carapace is approximately rectangular; its anterior border is obscured by presumed chelicerae and palpal endites. The pedipalps are preserved bent to the left in the part. The walking legs are setose but lack bristles or spines, and the proximal podomeres are poorly preserved. The tarsal claws are small and stout, and small teeth can be seen in Figs. 13 and 14. Leg III is very short; and legs I, II, and IV are approximately the same length, giving a leg formula of 1243. The abdomen is not preserved. The specimen almost certainly represents a juvenile, as evidenced by the short, undifferentiated podomeres. Presumably, like the South African specimen, it fell into the lake waters and died there.

DISCUSSION

There is little doubt that the South African specimen is a spider; no other arachnid order presents the same arrangement of prosomal appendages, palpal endites and sternum. The broad sternum and presence of palpal endites (not known in mesotheles and most mygalomorphs) precludes the fossil from Mesothelae. If the spider were a mesothele or a mygalomorph, then the orthognath chelicerae would be expected to protrude conspicuously well beyond the front of the body, as they do in compression fossil mesotheles (Selden 1996) and mygalomorphs (Eskov & Zonshtein 1990; Selden & Gall 1992) but not araneomorphs except where specially enlarged, e.g., in some

adult males (Eskov 1984; Selden 1990). Rather, the most anterior fragments of chelicerae occur only just anterior to the humps which represent the cheliceral bodies and palpal endites. The general appearance of the spider, with rather long and slender legs, a leg formula of 1243, lack of leg scopulae and with generally rather sparse bristles, are features suggestive of Araneomorphae rather than Mygalomorphae. Furthermore, this leg shape and arrangement, the lack of spines (only bristles), the small tarsal claws and lack of scopulae, the paucity and arrangement of bristles, and the possible metatarsal trichobothrium seen on one leg are all suggestive of Araneoidea. While it is impossible to be precise about the number of leg bristles, there appears to be a pattern. All legs have a superior bristle near the distal edge of the patella (also on the pedipalp) and a row of three bristles on the superior side of the tibia. In addition, there are at least two bristles on the superior side of femur I. Griswold et al. (1998) demonstrated the existence of a clade of Araneoidea in which femoral spination is lacking—the spineless femora clade—which includes Theridiidae, Nesticidae, Cyatholipidae and Synotaxidae. The South African fossil spider cannot belong in this clade.

Circumstantial evidence may also be helpful in determining the systematic placement of the South African spider. The Molteno shale is interpreted as having accumulated in a anaerobic, abandoned river channel. Many modern spiders live close to such an environment, including lycosoids (e.g., lycosids and pisaurids) which favor damp habitats, and tetragnathids which build orb webs among waterside vegetation. Lycosoids are adept at walking on water, but orb-weavers are likely to drown if they actually fall into water. Indeed, a fossil tetragnathid and other orb-weavers are known from waterside situations in the Jurassic and Cretaceous (Eskov 1984; Selden 1990). The preservation of the Triassic mygalomorph, *Rosamygale* Selden & Gall 1992, was unusual in that sea-water inundation was involved.

The identity of the Virginia specimen is less secure. Like the South African specimen, it is also clearly a spider because of the leg and podomere arrangement. The short, undifferentiated podomeres and undeveloped pedipalp suggest an immature. The very short third leg

is distinctive and typical (but not diagnostic) of Orbiculariae. The short, dentate tarsal claws do not give a clue to relationships but are common among web weavers.

In the *Treatise on Invertebrate Paleontology*, Petrunkevitch (1955) listed five genera of spiders from the Carboniferous period tentatively referred to Araneomorphae. Three of these, *Archaeometa* Pocock 1911, *Arachnometa* Petrunkevitch 1949, and *Eopholcus* Frič 1904 (family Archaeometidae Petrunkevitch 1949) were placed in a new superfamily Archaeometoidea Petrunkevitch 1955, diagnosed as 'Presumptive Trionychi with segmented abdomen.' The other two, *Pyritaranea* Frič 1901 and *Dinopilio* Frič 1904 (family Pyritaraneidae Petrunkevitch 1953), were placed in a new superfamily Pyritaraneoidea Petrunkevitch 1955 and diagnosed as 'Presumptive Dionychi with laterigrade legs and segmented abdomen.' Petrunkevitch (1955: 132) noted problems in regarding these specimens as araneomorphs: abdominal segmentation and lack of araneomorph synapomorphies. All of these specimens are currently being studied by PAS. Preliminary studies indicate that *Archaeometa*, *Arachnometa*, and *Dinopilio* are arachnids but not spiders, while *Eopholcus* and *Pyritaranea* may be spiders but are not sufficiently well preserved to determine their affinities. No other fossil araneomorph spiders are known from the Paleozoic era or the Triassic period of the Mesozoic era, thus the specimens described herein are the oldest known fossil spiders which can be referred to Araneomorphae with some degree of confidence.

The discovery of araneomorph spiders in the Triassic period is not unexpected, since the existence of their sister group, Mygalomorphae, in strata of similar age (Selden & Gall 1992) predicts this. Furthermore, the discovery of a mesothele spider in rocks of Pennsylvanian age (Selden 1996) is a predictor that Opisthothelae (Mygalomorphae + Araneomorphae) occurred at that time too, so it is indeed possible that araneomorph spiders may be found in earlier strata. However, no fossil spiders have yet been found in strata of Permian age (which immediately precedes the Triassic), despite the fact that a vast number of insect fossils are known from that period. Fossil spiders from this period should prove to be extremely interesting (Eskov 1990). The fossils described here are not primitive araneomorphs, which suggests that a fair degree of radiation had occurrred among araneomorphs before the late Triassic. The existence of similar forms in South Africa and Virginia, widely separated geographically and subject to different climatic regimes (though on the same continent), is further evidence in support of this hypothesis.

SYSTEMATICS

[*Note:* Due to the lack of autapomorphic characters, the diagnoses given below are not comparative.]

Infraorder Araneomorphae Smith 1902
?Superfamily Araneoidea Latreille 1806
Triassaraneus Selden new genus

Type and only species.—*Triassaraneus andersonorum* new species, see below.

Etymology.—The genus name refers to Triassic, the stratigraphic period from which the specimen originates, and *Araneus*, a widespread genus of spiders which the fossil superficially resembles.

Diagnosis.—Araneomorph spider, possibly araneoid; sternum wider than long and with straight anterior border.

Triassaraneus andersonorum Selden new
species
Figs. 2–8

Holotype.—PRE/F 18560a (part) and 18560b (counterpart), immature, or mature female, from Member Z of the late Triassic (Carnian) Molteno Formation at the Upper Umkomaas 'Waterfall Locality' (UMK III), Natal-Kwazulu, South Africa; deposited in the National Botanical Institute, Pretoria, South Africa.

Etymology.—The trivial name honors Drs. John and Heidi Anderson who found this specimen and kindly passed it on for description.

Diagnosis.—As for the genus.

Description.—Carapace not visible. Anterior part of prosomal body shows a pair of humps representing palpal endites and chelicerae beneath (as specimen is viewed). Layers of cuticle bearing well-sclerotized areas also suggest this is the case. Posterior to palpal endites another raised area represents sternum which is wider than long, posterior border gently procurved, anterior border straight, lat-

eral edges more vague but apparently curved outwards. Pedipalp fe, pa and ti/ta preserved, latter podomeres rather thickened, and visible on left side of part extending beyond cuticle fragment as a hump (*cf.* endites and chelicerae); pa bears superior bristle. Approximate lengths of Pd podomeres: fe 0.3, pa 0.1, ti/ta 0.4. All legs with superodistal bristle on pa, line of 3 superior bristles on ti (middle longest), small paired ta claws (median claw not seen), no scopulae; possible mt trichobothrium visible on leg 3, leg I fe with row of at least 2 superior bristles. Approximate lengths of leg podomeres: leg I: fe 1.3, pa 0.2, ti 1.4, mt 1.2, ta 0.6, total 4.7; leg II: fe 1.3, pa 0.2, ti 1.2, mt 1.0, ta 0.3, total 4.0; leg III: fe 0.9, pa 0.2, ti 0.8, mt 0.7, ta 0.4, total 3.0; leg IV: fe 1.0, pa 0.2, ti 0.9, mt 0.8, ta 0.3, total 3.2. Leg formula 1243. Abdomen not visible.

Argyrarachne Selden new genus

Type and only species.—*Argyrarachne solitus* new species, see below.

Etymology.—Greek: *argyros*, silver, and *arachne*, a spider, referring to the appearance of the fossil spider as silvery streaks on a black rock.

Diagnosis.—Araneomorph spider with subrectangular carapace and short, stout, dentate tarsal claws.

Argyrarachne solitus Selden new species
Figs. 9–14

Holotype.—VMNH 782 (part and counterpart), immature, from the late Triassic (Carnian) Cow Branch Formation at Solite Quarry, Cascade, Virginia; deposited in the Virginia Museum of Natural History, Martinsville, Virginia.

Etymology.—The trivial name refers to the Virginia Solite Corporation, in whose quarry the specimen was found.

Diagnosis.—As for the genus.

Description.—Carapace roughly parallel-sided with straight posterior margin, anterior border obscured by presumed chelicerae and palpal endites. Total length of preserved carapace + chelicerae/endites 0.7 mm. Pedipalps short, not swollen. Walking legs setose, lacking bristles, proximal podomeres poorly preserved. Tarsal claws small, stout, dentate. Approximate lengths of leg podomeres: leg I: ti 0.42, mt 0.43, ta 0.51; leg II: ti 0.38, mt 0.39, ta 0.51; leg III: ti 0.31, mt 0.29, ta 0.26; leg IV: ti 0.43, mt 0.49, ta 0.45. Leg III very short, legs I, II, and IV approximately the same length; leg formula 1243. Abdomen not preserved.

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