

REVISION OF THE GENUS SALTICUS (ARANEA: SALTICIDAE),
NORTH AMERICA, NORTH OF MEXICO

by

RAYMOND ALLEN SWEET

B.S., Manchester College, 1967
M.A., University of South Florida, 1973

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Entomology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1981

Approved by:



Major Professor

SPEC
COLL
LD
2668
T4
1981
S93
C.2

TABLE OF CONTENTS

PART I

List of Figures.....	iii
Introduction.....	1
Materials and Methods.....	3
Description of the Genus.....	5
Key to Females.....	7
Key to Males.....	8
Description of <u>scenicus</u>	9
Description of <u>austinensis</u>	11
Description of <u>rothi</u>	16
Introduction to the peckhamae Group.....	17
Description of <u>peckhamae</u>	20
Description of <u>alverae</u>	22
Description of <u>curvispinus</u>	24
Description of <u>purpureus</u>	28
Description of <u>palpalis</u>	29
Description of <u>rubiginus</u>	31
Description of <u>regalus</u>	35
Description of <u>imitatus</u>	37
Description of <u>rostrus</u>	41
Acknowledgements.....	45
Literature Cited.....	47

PART II

Appendix A, Literature Review.....	48
Appendix B, Morphology of a Spider.....	50
Appendix C, Systematic Analysis.....	58
Appendix D, List of Monographs of Male Genitalia.....	73
Appendix E, Bibliography.....	75
Vita.....	77

LIST OF FIGURES

FIGURE

1-2	<u>S. scenicus</u>	13
3-4	<u>S. austinensis</u>	13
5-6	<u>S. rothi</u>	13
7-8	<u>S. peckhamae</u>	13
9-10	<u>S. curvispinus</u>	13
11-12	<u>S. purpureus</u>	13
13-14	<u>S. alverae</u>	18
16-17	<u>S. rubiginus</u>	18
18-19	<u>S. imitatus</u>	18
20-21	<u>S. regalis</u>	18
22-23	<u>S. palpalis</u>	18
24	<u>S. scenicus</u> male.....	25
25	<u>S. austinensis</u>	25
26	<u>S. rothi</u>	25
27	<u>S. peckhamae</u>	25
28	<u>S. curvispinus</u>	25
29	<u>S. alverae</u>	25
30	<u>S. imitatus</u>	32
31	<u>S. rostrus</u>	32
32	<u>S. rubiginus</u>	32
33	<u>S. regalis</u>	32

MICROGRAPHS - FEMALES

34	<u>S. scenicus</u>	38
35-36	<u>S. austinensis</u>	38
37	<u>S. rothi</u>	38
38	<u>S. peckhamae</u>	38
39	<u>S. alverae</u>	38
40	<u>S. curvispinus</u>	42
41	<u>S. purpureus</u>	42
42	<u>S. rubiginus</u>	42

43	<u>S. regalus</u>	42
44	<u>S. imitatus</u>	42
45	<u>S. regalus</u> (A Variety From San Diego Co., CA.....	42

MAPS

46	<u>S. scenicus</u> (above 36° longitude).....	44
47	Distribution of Western Species of <u>Salticus</u>	44

MICROGRAPHS

48-49	<u>scenicus</u>	73
50-51	<u>rothi</u>	73
52-53	<u>curvispinus</u>	73
54	<u>austinensis</u>	73
55	<u>peckhamae</u>	73
56-57	<u>alverae</u>	73
58	<u>regalus</u>	73
59	<u>rubiginus</u>	73
60	<u>imitatus</u>	73

INTRODUCTION

The objective of this revision is a classification that will allow identification of the spiders of the Salticid genus Salticus from America North of Mexico. The absence of detailed illustrations has resulted in much confusion and has hampered our ability to identify specimens of this genus. Therefore, descriptions and illustrations in this paper will include only those morphological characters that are important to species delimitation. Significant literature citations are included; a complete bibliography is found in Bonnet (1956), Peckham and Peckham (1909) and Roewer (1954).

Salticus is represented in the world fauna by over 90 species (Bonnet, 1956). Salticus scenicus (Clerck), the best known species, has been collected in the temperate and subtropical zones of four continents (North America, Europe, North Africa and South America). They are active during the sunny part of the day and are often found on the sides of brick buildings where their cryptic coloration makes them difficult to observe. They feed on small insects such as Cicadellidae (Homoptera), Chironomidae and Psychodidae (Diptera). The other species are not as active and, except for S. austinensis, are not found around man made structures. Their diet is similar, but they generally forage in trees including Salix niger Marsh, Ulmus americana L., Acacia spp or Juglans nigra L.

Salticus congregate under loose bark, rocks, or similar structures when not hunting or selecting mates. Males pass

the winter as subadults or as adults. Females pass the winter as subadults, probably the penultimate instar, and frequently with or near a male.

Although this revision deals primarily with species found in Canada and the United States, some of these species will extend into Mexico. All included locality records and measurements are based on specimens actually examined by the author. Types have not been designated for any of the previously described strictly American species of Salticus and lectotypes are herein designated. S. palpalis has been misidentified in the subsequent description by Peckham (1909). Peckham's description is the basis for a new species designation (Salticus rubiginus).

Common anatomical terms are illustrated in Appendix figures (I-XIII), or see Comstock (1910, 1913). However, it was necessary to create new terminology for atrial structures not described in the literature. Depth of the atrium, especially in those species that have a rectangular boxlike atrium, is an important aspect in species separation and therefore necessary to describe. New terms: atrial groove (AG); anterior atrial wall (AAW); and lateral atrial wall, describe the open ended (at posterior median notch) and topless boxlike structure. Depth of the groove is compared to the height of the anterior atrial wall which contains the orifice and sometimes a median septum (Schick 1969). The apical spine on the male tibia of the pedipalp that rests dorso- to ventrolaterally between the tegulum or anterior edge of the cymbium and the apophysis located on the apical ectolateral

edge of the tibia is designated as the apical tibial spine (ATS) in this study.

MATERIALS AND METHODS

All descriptions and measurements are of specimens preserved in ethyl or isopropyl alcohol (KSU uses 70% isopropyl). The measurements were made with an ocular micrometer in a Leitz stereoscopic microscope. Whenever possible, 20 randomly (Snedecor and Cochran, 1939) selected males and females from each taxon were measured for the traditional Salticid characters of Galiano (1963), some personal alterations, plus additional characters that I selected for analysis (Appendix B). The data were recorded and analyzed by computer (data not included here are found in Appendix C), (Sweet 1981). Detailed illustrations of genitalia and other pertinent structures were drawn and photographed. Scanning electron micrographs of the female epigynum and the embolus and tibial spine of some males are included to augment line drawings. Micrographs of male and other female structures were made but not included here; they are in the author's possession. Attempts to rear specimen of immature Salticus were unsuccessful. Immatures of S. scenicus and S. austinensis were preserved in Oudemans's solution for internal study. Measurements were made in millimeters, the range is followed by the mean which is in parenthesis.

Male genitalia should be viewed from the mesolateral edge of the cymbium, positioned so that the substrate or light can

be seen through the space between the cymbium and tibial apophysis, simultaneously exposing the apical tibial spine within the gap and the embolus. The pedipalp must be removed for best analysis.

All specimens of new species used as SEM material in this study have been assigned paratype status. The specimen of austinensis from Travis Co. TX. was marked type when received, undoubtedly, the specimen was viewed by Gertsch in 1936, and is designated as the lectotype. New names other than patronyms are to be considered as an arbitrary collection of letters. Specific text figures are indicated by the letters Fig. under species names, before each description. Appendix figures are indicated by Roman numerals.

The left male palp and the epigynum were removed from the female, as described by Levi (1965), on a randomly selected percentage of each taxon, sorted for external similarities. Illustrations for male and female genitalia (Figs. 1-33) were made using a camera lucida at magnifications of 100X. Figures were drawn from the following aspect:

epigynum - ventral view

spermathecae and copulatory ducts - dorsal view

male palp and tibia - ventral view

Complete bibliographic references for Salticidae and Sal-
ticus can be found in Roewer (1942-1964); Bonnet (1945-1961)
and Vogel (1961-1979); therefore, I have included only references
pertinent to this study.

Genus Salticus Latreille

Araneus Clerck, 1757, Sv. Spindl. p. 117.

Type species: A. scenicus Clerck

Salticus Latreille, 1804, Nouv. Dict. d'hist. 24:135.

Type species: Araneus scenicus Clerck

Epiblemum Hentz, 1832, Amer. Journ. Sci. Y Arts, 21:108.

Type species: Epiblemum faustum Hentz

Calliethera Koch, 1837, Uef. A. Syst., I. p. 30.

Type species: Salticus histrionica, p. 37

Description: Carapace elongate, nearly twice as long as wide, moderately flattened, height .65-.85mm, clothed with various scales and hairs producing distinctive patterns and colorations peculiar to each species, especially white scales behind the posterior median eyes (PME) and posterior lateral eyes (PLE); ventrolateral margins of the carapace with thick border of white scales; anterior eyes straight or slightly recurved, anterior median eyes (AME) subtouching, approximately twice the diameter of the anterior and posterior lateral eyes; posterior median eyes approximately 1/5 diameter of AME; clypeus indistinguishable; basal cheliceral segment porrect and elongate in males, fang furrow with a single retromarginal tooth in both sexes; endites approximately twice the length of the labium; labium $\frac{1}{2}$ as long as wide, width of base equal to or slightly greater than anterior width of sternum; leg 1 slightly thicker, formula 4(31)2 or 4312 in females and 1432 or 4132 for males. Male palpus with tibia broader than long, with ectolateral apophysis, usually with a spine present apically between cymbium and tegulum, directly below the tegulum; tegulum slightly longer than broad.

Diagnosis and Comments: Salticus can be separated from all other North American Salticid genera by the following characteristics: the absence of ventral tibial spines on legs I and II; the accentuated flatness of the carapace that produces ant-like features, the elongate male chelicerae, the extremely narrow clypeus, and the presence of iridescent multicolored scales which it shares with closely related species.

The shape and angles of the median septum (Schick 1969) and lateral walls of the atrium, ventral view (Fig. IX), and the spermathecae, copulatory ducts (CD) and accessory structures internally (Fig. X), are diagnostic for females.

The scales, hair patterns and the genitalia are important diagnostic characters for species of Salticus. Black, dark red-brown and rusty to bright red-orange hairs are present in one group of Salticus while opaque iridescent magenta and/or green scales prevail in the other. Opaque scales blended with usually present white scales help differentiate Salticus from other taxa. Opaque scales also assist in separating closely related species. Those species with colored hairs and white scales have complete and incomplete transverse abdominal bands while species with only scales have abdominal markings only in alverae where they occur as stripes.

Salticus appears to be closely related to the genus Bredana. It is distinct in the porrect enlarged male chelicerae, the absence of ventral spines on legs I and II, and the moderately simple palpus of the males.

Key to Females

- 1a. Epigynum flattened posteriorly, form concavity or concavities anteriorly, atrium heart shaped.....2
- b. Epigynum rectangular, with a groove from the median septum to posterior median notch that is $1/3$ to equal in depth to the height of the anterior atrial wall (AAW).....4
- 2a. Triangular patches of white scales behind PLE, anterior atrium forms two rounded pits (Fig. 1).....scenicus (Clerck)
- b. White scales behind the PLE form a transverse band or an X over the thorax, anterior atrium flat with two flat pits (Fig. 37) or hooded (Fig. 35).....3
- 3a. Hood present (Figs. 3 and 36)....austinensis Gertsch
- b. Hood absent, orifices exposed, atrium flat (Figs. 5 and 37).....rothi, n. sp.
- 4a. Body covered with scales, no hairs forming bands, no transverse bands of white scales.....5
- b. Body with bands of hairs interspersed with transverse bands of white scales.....8
- 5a. Body with lateral stripes (Fig. 15) ..alverae, n. sp.
- b. Body without stripes or markings.....6
- 6a. Atrial groove uniformly deep, (Fig. 38) equal to height of vertical anterior atrial wall, color green.....peckhamae (Cockerell)
- b. Atrial groove shallow (approximately $1/3$ - $1/2$ as deep as the sloping anterior atrial wall), pit formed anteriorly, color variable.....7
- 7a. Anterior wall 30° , groove less than $1/3$ height of AAW (Fig. 39).....curvispinis, n. sp.
- b. Anterior pit deep, anterior wall 60° , groove $1/2$ height of AAW (Fig. 40).....purpureus, n. sp.
- 8a. Carapace with broad band of white scales behind PLE, abdomen with black hairs.....9
- b. Carapace without white scales behind PME, abdomen with rufus to bright red-orange hairs.....10

- 9a. Anterior atrium a deep pit, groove a gradual incline to the posterior median notch (Fig. 22)....
.....palpalis (Banks)
- b. Anterior atrium not a pit, a vertical wall (Fig. 44), groove depth equal to height of AAW.....
.....regalus, n. sp.
- 10a. Atrium deep, equal to depth of sloping 75° AAW (Fig. 43), spermathecae bowed laterally and deeply curved dorsally.....rubiginus, n. sp.
- b. Atrium deeply rounded (Fig. 45), spermathecae angled on copulatory ducts, (Fig. 19).....imitatus, n. sp.

Key to Males

- 1a. Tibial apophysis not bifid (Fig. 48).....2
- b. Tibial apophysis bifid (Figs. 27-33).....4
- 2a. Apophysis not truncate, twisted (Fig. 24, 48), embolus erect, cone shaped.....scenicus, (Clerck)
- b. Apophysis truncate, embolus not erect.....3
- 3a. Embolus elongate, curved towards apophysis, apophysis not notched (Fig. 25)..austinensis Gertsch
- b. Embolus acute (Figs. 26 and 51), apophysis notched mesally (Fig. 50).....rothi, n. sp.
- 4a. Embolus acute, anterior tibial spine (ATS) on palp hookshaped (Figs. 26 and 28).....curvispinus, n. sp.
- 4b. Embolus bifid, ATS variable.....5
- 5a. Embolus deeply bifid, ATS narrow (Fig. 59), acute apically (Fig. 32).....rubiginus, n. sp.
- 5b. Embolus roundly and narrowly bifid, ATS thick, truncate, curved or twisted apically, 1/2 to 2/3 length of rubiginus (Figs. 26, 27 and 29).....6
- 6a. ATS acute, 1.2 to 2/3 length of rubiginus, slightly truncate; body with black hairs, broad white band behind PLE, (Fig. 33).....regalus, n. sp.
- 6b. ATS variable, body not black, no white scales behind PLE but opaque scales of magenta and/or green iridescence cover carapace and/or body.....7

- 7a. Body without bands, but abdominal stripes may be present.....9
- b. Body with bands of reddish brown hairs and white scales.....8
- 8a. Carapace green, ATS finger-shaped (Figs 58).....imitatus, n. sp.
- b. Carapace light magenta, ATS hook-shaped (Fig. 31)...rostrus, n. sp.
- 9a. Abdominal lateral stripes present (Fig. 15), median stripe copper colored, apex of ATS twisted (Figs. 56-57).....alveraeae, n. sp.
- b. Abdomen covered with dark green iridescent scales, no stripes present, apex of ATS curved (Fig. 58)....peckhamae (Cockerell)

Salticus scenicus (Clerck)
Figs. 1-2, 24, 34, 46, 48-49.

Araneus scenicus Clerck, 1757, Svenska Sp., p. 117, pl. 5, Fig. 13.
Aranea scenica, Linnaeus, 1758, Syst. Nat, ed. X, p. 623.
Salticus scenicus, Latreille, 1804, Nouv. Dict. d'hist. 24:136.
Epiblemum scenicum Emerton, 1891, Trans. Conn. Aca. Sci., 8:238, p. 19, Fig. 2-2g.
Salticus scenicus, Peckham and Peckham, 1909, Trans. Wis. Acad. Arts and Sci. 16:477, pl. XLII, Figs, 8-8a.
Salticus scenicus, Kaston, 1948, State of Ct. Geological and Nat. His. Survey, Bull. 70. Hartford. p. 453 pl. 88, Figs. 1634-1635; pl. 89, Figs. 1650-1654.

Description of Female: Carapace wide, red-brown posteriorly, ocular quadrangle black, white scales cover a broad area behind anterior eyes from inside edges of ALE, remainder of quadrangle covered with dark red-brown hairs, white scales form triangles behind posterior lateral eyes towards thoracic groove, not touching groove mesally, remainder of thorax covered with opaque scales to thoracic declivity; clypeus visible, 10-20 microns, thickly covered with white scales and hairs that converge over

chelicerae mesally; legs annulated to proximal tip of tarsus; epigynum heart shaped, symmetrical pits surrounding each intermittent orifice in anterior 2/5 of atrium; median septum slight, narrowly separates the pits, forms a slight rim for pit; copulatory ducts narrow, widely separated, join spermathecae mesolaterally, converge posteriorly; spermathecae irregularly shaped, (Fig. 2), converging posteriorly, not touching; an additional diverticula ectolateral to juncture of tubes; median diverticula located anterior to juncture mesolaterally.

Measurements of 20 mature females. Total length, 4.3-6.4 (5.36); carapace length, 1.90-2.85 (2.29); carapace width 1.3-2.00(1.59); carapace height, .65-1.1(.88); leg I length, 3.5-5.45(4.24); leg II length, 3.0-4.75(3.79); leg III length, 3.35-5.45(4.25); leg IV length, 4.1-6.55(5.19).

Description of male: Darker than female, chelicerae usually dark reddish brown; tibial apophysis twisted; ATS transparent or absent in Eastern forms, stout and obvious in Western forms; embolus erect, irregularly coneshaped with opening at apex, (Fig. 48).

Measurement of 20 mature males: Total length, 4.0-6.1(4.65); carapace length, 1.65-2.65(2.30); carapace width, 1.1-1.95(1.58); carapace height, .7-1.0(.8); leg I length, 3.8-6.2(5.17); leg II length, 3.05-5.0(4.09); leg III length, 3.35-5.35(4.32); leg IV length, 3.8-6.5(5.05).

Range: North of latitude 36°N., from Oregon to the Atlantic. Most abundant East of the Rockies.

Diagnosis and comments: S. scenicus is very distinct with white triangular patches behind the posterior lateral eyes and a prolateral apical metatarsal spine on leg II of the females. It is apparently most closely related to austinensis. They share circular anterior atrial pits, and spermathecae with irregular shapes that are approximately twice the size of the copulatory ducts. The ducts in austinensis bow laterally and in scenicus are parallel and centrally located (Fig. 2). They both have hairs in combination with scales over the carapace and some opaque iridescent scales scattered through hairs and bordering white bands of scales. The male embolus of scenicus is erect and truncate apically (Fig. 49), as contrasted to austinensis where it is elongate and bent laterally (Fig. 25 and 54). The tibial apophysis is twisted and acute apically in scenicus and truncate in austinensis.

Salticus austinensis Gertsch,
Figs. 3-4, 25, 35-36, 47, 54.

Epiblemum albo-cinctum Peckham, 1896, Occ. Papers Nat. His. Soc. Wisc., 3:84. name preoccupied, Figs. 8-8a.

Epiblemum albocinctum, Pickard-Cambridge, 1901, Bio. Cen. Amer. 2:300, pl. 29, Fig. 13.

Salticus albocinctus Simon, 1901, Histoire naturelle des Araignees. 2(3):601, Paris.

Salticus albocinctus (Peckham), 1909, Trans. Wisc. Acad. Sci., 16:479, pl. 44, Fig. 5.

Salticus austinensis Gertsch, 1936, Amer. Mus. Nov. #852 (new name for albocinctus Peckham, not Salticus albocinctus Koch, 1846).

Types: Female lectotype, Texas, Austin, Travis Co., (334), G.W. and E. G. Peckham collection, in the MCZ. Female paratype, Wichita Falls, Wichita Co., Coll. Rose Carpenter, 12-VI-1967,

in Invertebrate Collection, Midwestern State University. Male allotype, Kerrville, Kerr Co., Coll. Karl W. Haller, 10-XII-1954, Ibid.

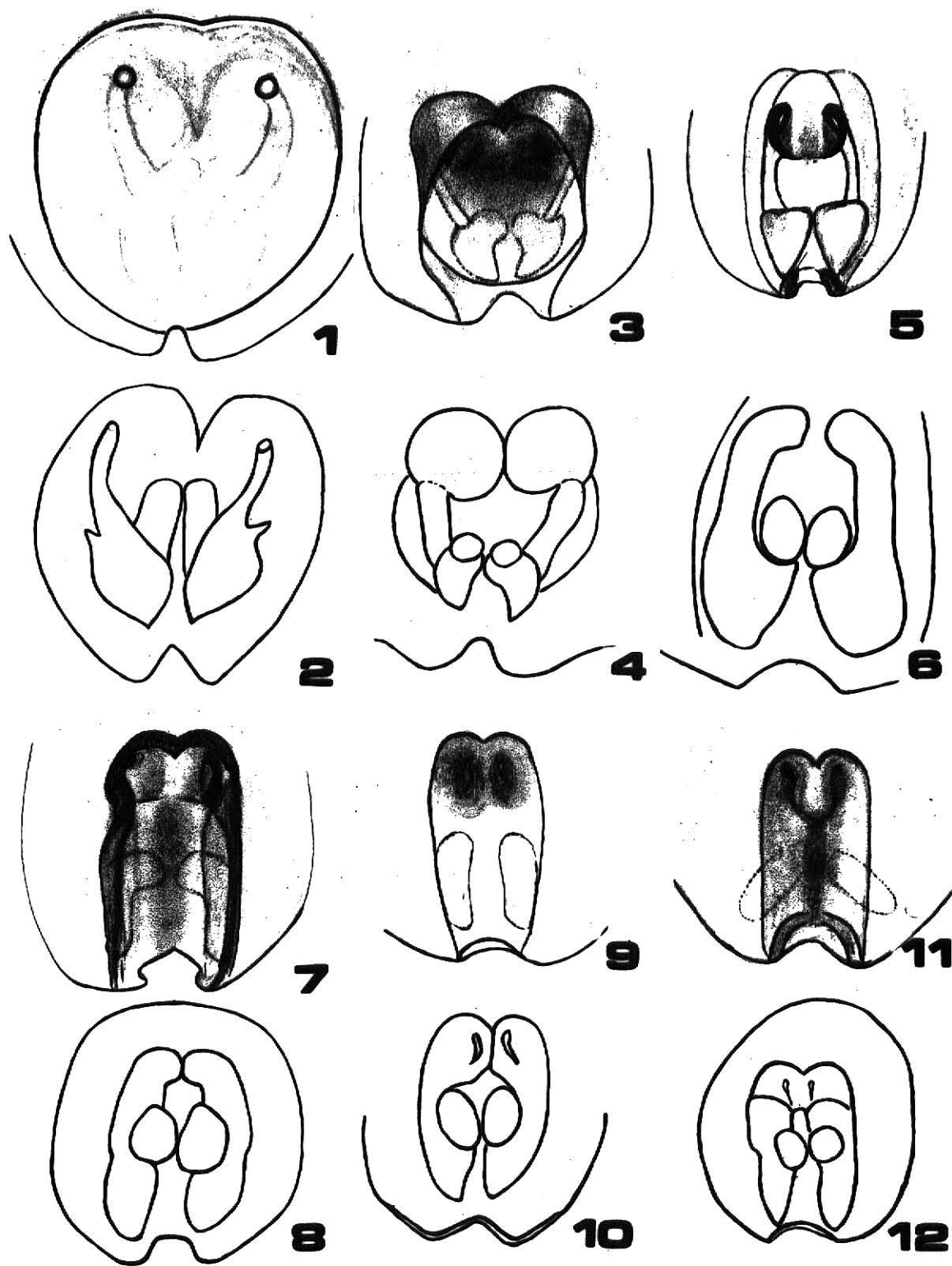
Description of female: Body with patches of hairs and bands of white scales; carapace with broad white band behind anterior row eyes and PLE; small patch white or golden iridescent scales between PME and PLE; remainder of carapace with black hairs and usually an off white X-shaped marking extending from posterior band to thoracic declivity; clypeus narrow, thickly covered with white scales and hairs converging mesally; anterior row of eyes a straight line; legs white-amber, covered with white scales extending to tarsus, femur and tibia of anterior legs occasionally with dull purple streaks; abdomen with 4 bands of white scales separated by 3 bands of black hairs, last white band encircling spinnerets; epigynum with two shallow rounded pits anteriorly, angling under hood (Fig. 35), spermathecae irregularly shaped, contiguous anteriorly, acute apically (Fig. 4); copulatory ducts much thinner than spermathecae, divergent anteriorly; diverticula divergent anteriorly, lyrate, contiguous.

Measurements of 20 mature females: Total length, 4.35-5.7 (4.89); carapace length, 1.90-2.3(2.08); carapace width, 1.25-1.60(1.39); carapace height, .65-.85(.725); leg I length, 3.05-3.80(3.49); leg II length, 2.40-3.55(3.01); leg III length, 3.15-4.0(3.54); leg IV length 3.75-4.8(4.38).

Description of male: Darker than female; carapace dark red brown, ocular quadrangle covered with black hairs, interrupted

FIGURES 1-12

1. ventral view of atrium - scenicus
2. dorsal view of spermathecae - scenicus
3. ventral view of atrium - austinensis
4. dorsal view of spermathecae - austinensis
5. ventral view of atrium - rothi
6. dorsal view of spermathecae - rothi
7. ventral view of atrium - peckhamae
8. dorsal view of spermathecae - peckhamae
9. ventral view of atrium - curvispinus
10. dorsal view of spermathecae - curvispinus
11. ventral view of atrium - purpureus
12. dorsal view of spermathecae - purpureus



by white scales completely behind anterior row of eyes; usually a patch of white scales behind PME; a broad white band of white scales extend behind PLE across the thoracic groove to posterior edge in forming X; anterior row of eyes recurved; legs banded; abdomen with bands of black hairs and white scales, some magenta and/or green and golden scales between white and black bands; tibial apophysis truncate, (Fig. 25), usually white-amber, covered with white scales; cymbium covered with white scales and black hairs to tip, dull amber color; embolus elongate, deeply rounded in proximal 1/3, apical 2/3 narrowed significantly and curved laterally (Fig. 25).

Measurements of 20 mature males. Total length, 3.7-5.6 (4.51); carapace length, 1.7-2.85(2.18); carapace width, 1.2-1.65 (1.44); carapace height; .6-.85(.76); leg I length, 3.35-6.25(5.48); leg II length, 2.6-4.1(3.42); leg III length, 2.7-4.3 (3.6); leg IV length, 3.45-5.05(4.39).

Localities: KANSAS: Barton; Ellis; Meade; Stafford Co. OKLAHOMA: Payne; Tillman Co. TEXAS: Baylor; Clay; Coleman; Gillespie; Llano; Travis; Wichita Co.

Diagnosis and comments: Salticus austinensis is apparently most closely related to scenicus. The female pits are deeper, the median septum much more pronounced (Figs. 35-36) and the atrial ridge extends to form a hood over the laterally located orifices in austinensis. The females are very distinct. Males can be easily recognized by the embolus (Fig. 25). The markings are most similar to rothi n. sp. with a thick covering of white

scales behind the anterior row of eyes, and the PLE. The latter commonly form an X across the thorax and over the declivity.

Salticus rothi, n. sp.
Figs. 5-6, 26, 37, 47, 50-51.

Types: Female holotype, Arizona, Arivaca, Pima Co., 11-IV-1970, Coll. K. Stephan. (#463). Female paratype. Cottonwood, Pima Co. 29-III-1963, Coll. R. S. Beal, apparently nesting in old Sceliphron mud-dauber cell. Female paratype, Pinal Co., 8-III-1970, Coll. K. Stephan (FCA). Male allotype, Apache Lake, Reservation near Globe, on mesquite (Acacia sp.), under loose black bark, 13-VIII-1980, Coll. R. A. Sweet, in the AMNH.

Description of female: Carapace red brown with a broad white band of scales behind PLE that forms an X across the thoracic groove and fades posteriorly, metallic green scales cover remainder of carapace; anterior row of eyes in straight line; clypeus narrow, with a few thin white hairs converging mesally over cheliceral base; legs amber; abdomen similar to S. austinensis, with four bands white scales alternating with bands of black hairs; epigynum flat, anterior atrium pitlike, not deep or rounded, anterior wall a 25° angle; base of orifices with parallel slits, widely separated mesally; anterior 1.3 of copulatory ducts converging, posterior $2/3$ parallel; spermathecae join ducts ectolaterally, mesolateral area converging, nearly touching; diverticula anterior to mesolateral spermathecae and lateral to the copulatory duct at juncture, touching mesally.

Measurements of three mature females: Total length, 3.9-4.4 (4.2); carapace length 1.6-1.9(1.75); carapace width, 1.1-1.3(1.2);

carapace height .65-.75(.70); leg I length, 2.75-3.53(3.11); leg II length, 2.45-2.95(2.67); leg III length, 2.90-3.35(3.10); leg IV length, 3.70-4.35(3.97).

Description of male: Resembles female, black region slightly darker; tibial apophysis truncate, slightly bifid medially; apical tibial spine hooks ventrally, located dorsally between cymbium and apophysis; embolus acute (Fig. 26).

Measurements of male allotype: Total length, 3.65; carapace length, 1.65; carapace width, 1.1; carapace height, .65; leg I length, 3.85; leg II length, 2.55; leg III length, 2.65; leg IV length, 3.4.

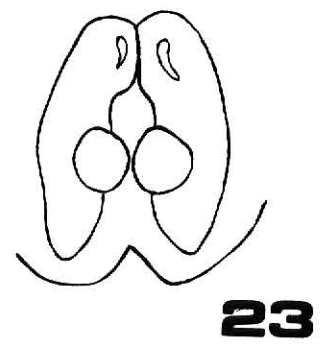
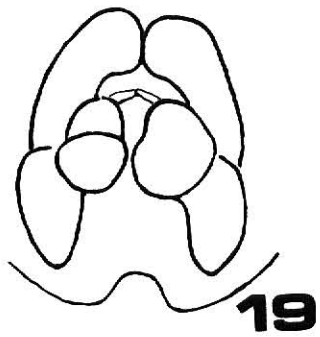
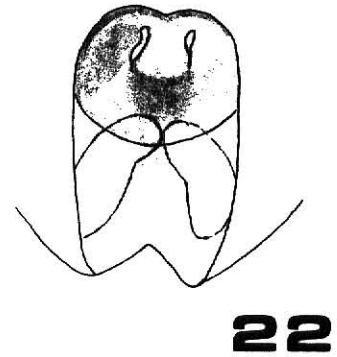
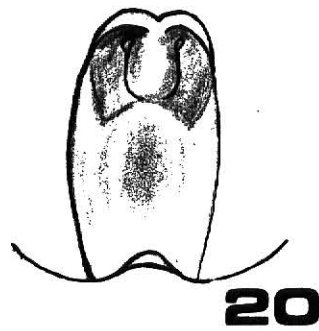
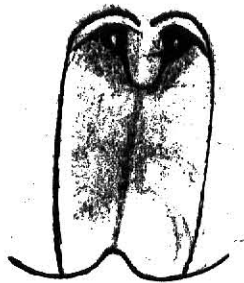
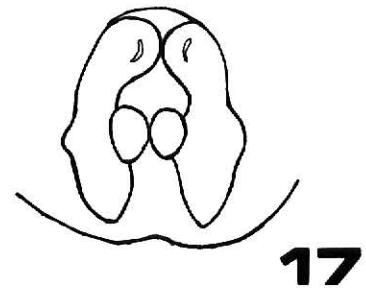
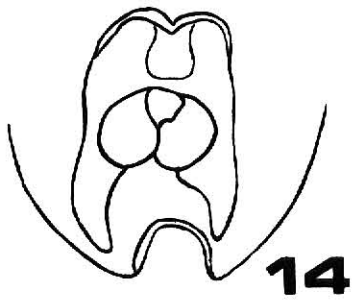
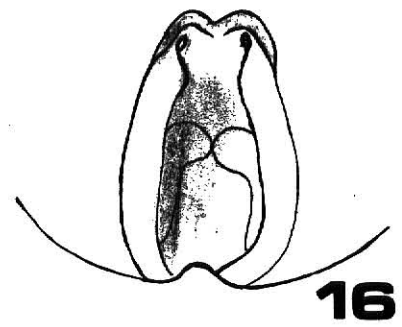
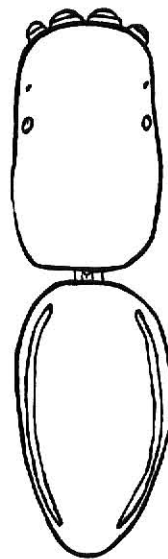
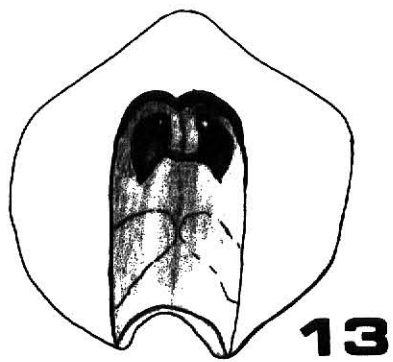
Localities: ARIZONA: Pinal; Pima Co.

Diagnosis and comments: Salticus rothi is apparently most closely related to austinensis in three major characteristics; the atrium is heart shaped, the copulatory ducts are narrow and bowed laterally and the tibial apophysis of the males are truncate apically. The apophysis of rothi is narrower and slightly notched medially (Fig. 50). The atrium of rothi is much flatter with no ridge and a slight rim. The entire orifice wall slopes inward at an angle of 25° and forms a rounded pit (Fig. 37). The embolus of the rothi male is acute and the shape of the apical tibial spine (ATS) is unique (Fig. 51).

The next four taxa belong to a species group of Salticus that do not possess the stripes that normally characterize the zebra spiders (a common name for species of Salticus). Most are completely without abdominal markings and possess the multi-colored scales that produce the magenta and green iridescent

FIGURES 13-23

13. ventral view of atrium - alveraae
14. dorsal view of spermathecae - alveraae
15. dorsal view of body - alveraae
16. ventral view of atrium - rubiginus
17. dorsal view of spermathecae - rubiginus
18. ventral view of atrium - imitatus
19. dorsal view of spermathecae - imitatus
20. ventral view of atrium - regalus
21. dorsal view of spermathecae - regalus
22. ventral view of atrium - palpalis
23. dorsal view of spermathecae - palpalis



colors. Most specimen of this group have been previously identified as Salticus peckhamae (Cockerell) and clearly belong to a closely related species group. The distinguishing morphological character for females is the depth of the rectangular, boxlike atrium with top and posterior end open for reception of the embolus and associated male genital parts (Fig. 38). The anterior atrial wall, including intromittent orifices, form a 60 to 90° angle to the invisible horizontal plane passing through the atrial rim at the anterior border and meeting the basal atrial groove posteriorly. The shape of the embolus and that of the tibial spine (located between the cymbium and tibial apophysis) are diagnostic characters for the males of this group. The tibial apophysis is bifid.

Salticus peckhamae (Cockerell)
Figs. 10-12, 27, 38, 47.

Icius peckhamae Cockerell, 1897, Can. Ent. 29:223. pl. XLII, Fig. 9-9a, pl. XLIV, Fig. 6.

Salticus peckhamae, Peckham and Peckham, 1909. Trans. Wis. Acad. Arts and Sci. 16:476-478. pl. XLII Figs. 8-10, p. XLIV, Figs. 5-7.

Types: Female lectotype, NEW MEXICO, Mesilla Park, Dona Ana Co., Coll. Nathan Banks. Lectoparatypes from same vial (2). Male lectotype, TEXAS, Austin, Travis Co., 26-X-1967, Indian Cove, Coll. D & W Simon, in CFA collection. Male lectoparatype, Wichita Co., 3 mi. NW of Iowa Park, coll. Rose Carpenter, 28-IX-1968, beating mesquite 38 above ground, 100 yds. from water, 90°; 11 am - 3:30 pm. NCL, in Midwestern State collection.

Description of female: Body thickly covered with clear scales

that produce iridescent green and magenta; carapace mostly green with three white patches directly behind anterior eyes where ALE meet AME, and AME subtouch; anterior row of eyes straight; clypeus indistinguishable; sternum reddish brown with long thin white hairs and elongate white scales; legs banded, usually proximal 1/3 or 1/2 of each segment to tarsus; tarsus yellow orange; abdomen covered with light green iridescent scales dorsally, thickly covered with white scales ventrally; anterior atrial wall at 80° angle; each lateral wall approximately 85° angle (steep); median septum well developed; anterior dorsal rim extending slightly over top of intromittent orifices (Fig. 38); orifice slits parallel and united basally.

Measurements of three mature females: Total length, 4.3-4.9(4.53); carapace length, 1.70-1.9(1.9); carapace width, 1.15-1.3(1.23); carapace height, .7-.75(.726); leg I length, 2.7-3.1(2.9); leg II length, 2.3-2.8(2.58); leg III length, 2.7-3.25(3.05); leg IV length, 3.5-4.25(3.9).

Male: Body covered with iridescent green scales, similar to female, darker; legs banded (Banks 1904); tibial spine of pedipalp slightly hooked towards tibial apophysis (Fig. 27); embolus bifid apically.

Natural history: Found on bark of apple trees (Cockerell 1897).

Measurements of three mature males: Total length, 4.2-4.65(4.45); carapace length, 2.0-2.1(2.05); carapace width, 1.30-1.65(1.33); carapace height, .75-.8(.767); leg I length, 4.3-4.6

(4.4); leg II length, 2.95-3.25(3.10); leg III length, 3.25-3.55(3.40); leg IV length, 3.95-4.45(4.25).

Localities: NEW MEXICO: Donna Ana Co.; TEXAS: Travis Co.

Diagnosis and comments. The entire atrium is as deep as the height of the 80° anterior atrial wall (AAW) and the lateral walls are parallel. This condition plus the presence of thickened ridges (Figs 7 and 38) over the orifices separate peckhamae from other species. S. peckhamae is apparently most closely related to alverae. The above characters plus the green scales on peckhamae separate these species. The ATS is similar in both species; but careful analysis will discriminate the curved apex of peckhamae from the twisted apex of alverae (Figs. 55-57).

Salticus alverae, n. sp.
Figs. 13-15, 29, 41, 47.

Types: Female holotype, COLORADO, Canon City, Fremont Co., Coll. Nathan Banks, in the MCZ collection. Two female paratypes, IDAHO, Notus, Coll. Vera and Eileen Ivie, summer 1933, W. $116^{\circ} 50'$ N. $43^{\circ} 42'$. Male allotype, Notus, Ibid.

Description: Body multicolored; carapace with magenta and/or green scales, reddish brown behind PLE, ocular quadrangle black, especially around lateral eyes; three patches white scales behind anterior row eyes; eyes slightly recurved; abdomen with dorsolateral border covered with white scales, median longitudinal band coppery purple (dull in alcohol); epigynum (Fig. 13) not extremely deep with lateral walls 60° , anterior atrial wall $60-65^{\circ}$; median septum well developed, broad posteriorly (Fig. 41);

rim complete; copulatory ducts (dorsal view) touching anteriorly, spermathecae divergent posteriorly (Fig. 14).

Measurements of 8 mature females: Total length, 4.25-5.30 (4.66); carapace length, 1.8-2.00(1.89); carapace width, .65-1.3 (1.16); carapace height .60-.80*.71); leg I length, 2.9-3.35 (3.24); leg II length, 2.5-2.95(2.75); leg III length, 2.55-3.85 (3.26); leg IV length, 3.35-4.35(4.06).

Males similar to females except darker green; medial abdominal longitudinal band coppery purple with magenta green scales scattered (sparingly) throughout, sometimes with golden lustres.

Measurements of 6 mature males: Total length, 3.7-4.6(4.01); carapace length, 1.75-1.9(1.85); carapace width, 1.10-1.30(1.21); carapace height, .55-.75(.65); leg I length, 3.7-4.5(4.21); leg II length, 2.70-3.20(3.02); leg III length, 2.90-3.35(3.11); leg IV length, 3.50-4.05(3.87).

Localities: COLORADO: Fremont, Garfield Co.; IDAHO: Baine, Canyon, Payette, Washington Co.; OKLAHOMA: Cimarron Co.; OREGON: Malhuer Co.; SOUTH DAKOTA: Fall River Co.; UTAH: Box Elder, Juab, Millard, Piute, Sevier Co.; WYOMING: Natrona Co.

Diagnosis and comments: The lateral stripes on the abdomen separates this species from other Nearctic taxa. S. alverae is apparently most closely related to peckhamae. They differ in the depth of the atrial groove (channel) in the female; peckhamae has a rectangular and deep channel. Comparing depth of channel to height of AAW, that of peckhamae is as deep as the anterior atrial wall and that of alverae is 2/3 as deep as the sloping AAW.

The rims of peckhamae have thickened into ridges while the rim of alverae is slight and incomplete (Figs. 38 & 41). The orifices of peckhamae are more deeply set under the ridges. The male differences are described under peckhamae.

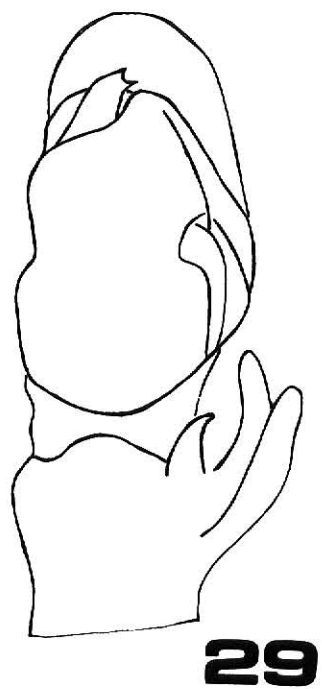
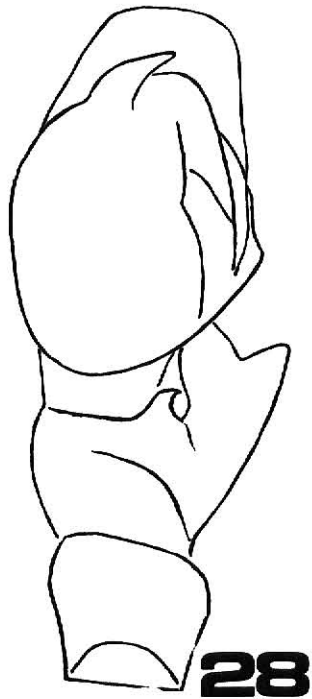
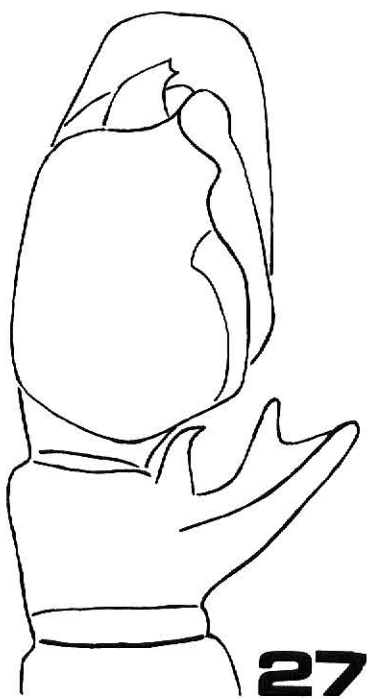
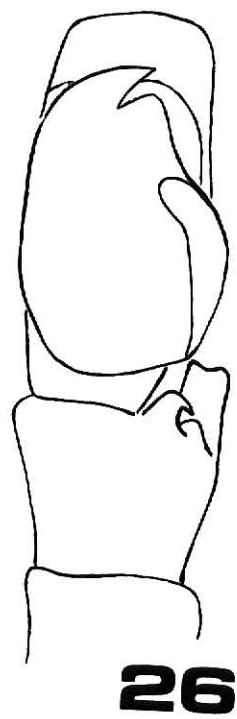
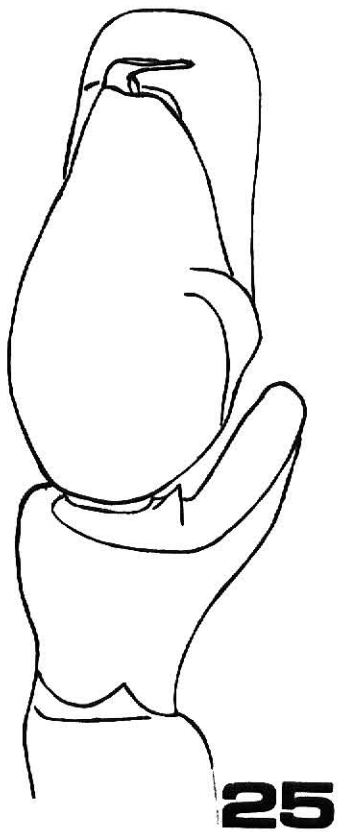
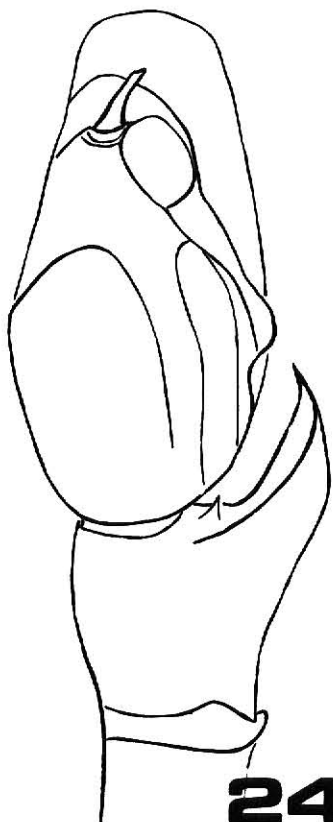
Salticus curvispinus, n. sp.
Figs. 9-10, 28, 39, 47, 52-53.

Types: Female holotype, CALIFORNIA, Mendocino Co., Northern Ca., Coast Range Pres. 4 mi. W. Branscomb, coll. E. Schlinger, 12-V-1975, in the Essig Museum, University of California, Berkely collection. Female paratype same data as holotype. Male allotype OREGON, Medford, Jackson Co., coll. Vernon Thatcher, IV-1947, in the AMNH collection. Male paratype, Medford, Jackson Co., coll. V. E. Thatcher. Aug-Sept. 1948, in the AMNH.

Description of female: Scales mostly light green, resembles female peckhamae; some magenta or silvery iridescence, no dorsal white scales; anterior row of eyes in straight line; clypeus narrow, few hairs converging mesally; legs annulated, yellow orange apically, bands dull purple iridescence over proximal portion of each leg segment except the tarsus, entire leg with white scales, thickest in light areas; leg I often dark to proximal tip of metatarsus; atrium flat posterior to intromittent orifices which form a pit at the anterior 1/3; median septum slightly elevated, helps form a 60° anterior wall, rim not well developed (Fig. 39); slits of intromittent orifices divergent at base of pit; outline of spermathecae diverticula seen through ventral atrial surface; copulatory ducts converging, contiguous

FIGURES 24-29

- 24. tibia and palp - scenicus
- 25. tibia and palp - austinensis
- 26. tibia and palp - rothi
- 27. tibia and palp - peckhamae
- 28. tibia and palp - curvispinus
- 29. tibia and palp - alverae



anteriorly, slightly bowed laterally, roundly uniting with spermathecae; spermathecae parallel, narrow posteriorly (Fig. 10); diverticula projected dorsally.

Measurements of 6 mature females: Total length, 4.0-4.2 (4.1); carapace length, 1.35-1.9(1.83); carapace width, 1.1-1.2 (1.15); carapace height, .6-.9(.78); leg I length, 3.45-3.75 (3.58); leg II length, 2.90-3.40(3.13); leg III length, 3.35-4.0(3.6); leg IV length, 4.55-5.05(4.73).

Description of male: Embolus acute; tibial spine beaklike in medial view (Fig. 28).

Measurements of 2 mature males: Total length, 4.0-4.2(4.1); carapace length, 1.35-1.9(1.83); carapace width, 1.1-1.2(1.15); carapace height, .55-.65(.60); leg I length, 3.55-4.2(3.88); leg II length, 2.65-2.90(2.8); leg III length, 2.95-3.3(3.13); leg IV length, 3.7-4.1(3.9).

Localities: CALIFORNIA: Mendocino; San Francisco; Shasta Co.; OREGON: Jackson Co.

Diagnosis and comments: S. curvispinus is apparently most closely related to rothi. The converging copulatory ducts are contiguous, the anterior atrial pit is deeper in curvispinus (Figs. 37, 40). Also, curvispinus is without hair covering and is completely covered by iridescent light green scales; rothi has black hair and scattered opaque scales. The males are similar in having the embolus acute apically and a curved anterior tibial spine, although the ATS or rothi is unique within the fauna of America north of Mexico, (Figs. 26, 28). The embolus of rothi

is more laterad than in the curvispinus. The tibial apophysis is bifid in curvispinus and truncate in rothi.

Salticus purpurus, n. sp.
Figs. 11-12, 40, 47.

Types: Female holotype, WASHINGTON, Vantage, Kittitas Co., VII-1953, Coll. Crabtree, in the AMNH collection. Female paratype, same data. Male unknown.

Description of female: Body covered with opaque scales; carapace magenta and green with white patches behind anterior row of eyes, remainder of ocular quadrangle thickly covered with opaque scales which extend to the thoracic declivity; anterior row of eyes in a straight line; legs dark proximal to tibia, dorsally amber, not banded, metatarsus and tarsus lighter; abdomen ground color purple (ash gray purple in alcohol), dorsum covered with opaque scales, sometimes with silvery appearance; epigynum rectangular, shallow, anterior wall a 60° angle, forms pit which reaches to spermathecal impressions, a deep channel ($\frac{1}{2}$ depth of pit) extends towards posterior median notch, lateral walls form angles of 75° ; orifices formed at juncture of anterior and lateral walls; anterior atrial rim rounded (Fig. 40); copulatory ducts fused anteriorly, parallel; spermathecae slightly divergent near posterior median notch (Fig. 12); diverticula mesodorsal to spermathecae.

Measurement of five mature females: Total length, 4.75-6.00(5.1); carapace length, 1.80-2.2(1.97); carapace width, 1.15-1.35(1.27); carapace height, .6-1.2(.68); leg I length, 3.15-3.65

(3.36); leg II length, 2.8-3.25(3.0); leg III length, 3.2-3.7 (3.45); leg IV length, 4.1-4.65(4.28).

Localities: CALIFORNIA: Lassen Co.; OREGON: Harney Co.; WASHINGTON: Kittitas Co.

Diagnosis and comments: The parallel spermathecae and copulatory ducts, the undivided rounded rim and the ash purple ground color of the abdomen serve to separate purpurus from other species. S. alverae appears to be most closely related to purpurus. The depth of the channel, the atrial rim, the white band of scales behind the anterior row of eyes and the absence of abdominal markings in purpurus separate these species.

Salticus palpalis (Banks)
Figs. 22-23, 47 15.

Epiblemum palpalis Banks, 1904, Proc. Ca. Acad, 13:360. pl. 39, Fig. 31 (not S. palpalis: P+P, 1909).

Type of monotype, (Palo Alto, Alameda Co.) Ca.

Description of female (original):

Cephalothorax iridescent golden or purplish, with some white scales, a broad white band just behind the dorsal eyes, side margins narrowly white, clypeus with a few white hairs; legs dark on femora, on patella and tibia I beneath, and on patella, tibia and metatarsus IV, rest of legs mostly pale, a pale stripe above on femora I and II; sternum dark. Abdomen black, with black and some yellowish scales; three transverse white bands one basal, one before middle, and one toward tip, a narrow white band encircles the spinnerets; these middle bands are straight across and not oblique as in E. scenicum; center dark, clothed with black and white hair. Structure in general similar to that of E. scenicum, but the cephalothorax is plainly longer than in that species. Length 5 mm. One female from Palo Alto (Baker).

Diagnosis and comments: A female from Sacramento, California in the collection of Helen Van Duzee, 27-V-1918, borrowed from

the Essig Museum, could possibly fit Banks' 1904 description. It is difficult to interpret the structure illustrated by Banks, therefore one must rely entirely on an interpretation of the description. The epigynum is similar to that of the Claremont material described by the Peckhams in 1909, but it is anteriorly more rounded, and posteriorly more flattened; the groove is not deep, but is rounded and flattened (Fig. 22). A pattern is not distinguishable from this specimen since it has been improperly preserved. Banks' description was of a female from Palo Alto, black in color and possessing a broad white band behind the dorsal eyes (PLE). This pattern exists in a variety of Salticus found east of California which include rothi, austinensis and imitatus; also in regalus from Southern California. Salticus rubiginus (palpalis of Peckham and Peckham 1909) has no white scales beyond the three anterior patches behind the anterior row of eyes. The carapace of rubiginus is thickly covered with the opaque scales which display the magenta iridescence. The abdominal hair color varies from dull rufus to bright red-orange. Banks, subsequent to his original description of palpalis, identified a specimen of rubiginus as palpalis. This specimen clearly matches the 1909 description of Peckham and Peckham and is not compatible with Banks' original description of palpalis.

Description of the Van Duzee specimen (damaged by preservative): carapace large, wide, devoid of scales; abdomen shrivelled and black between bands of white scales; anterior row of eyes slightly recurved; clypeus indistinct; epigynum forms a pit for

anterior 1/2 anterior to spermathecal impressions, posterior half a flat sloping groove; anterior wall an 80° angle, consists of area between the intromittent orifices (median septum), area lateral to orifice slits rounded to meet lateral walls; groove roundly angles to meet posterior tip of median septum, produces a deep anterior pit, groove shallow, deepest near pit; lateral walls shallowly rounded, forming approximately a 30° angle; copulatory ducts fused anteriorly, deeply bowed dorsally and narrowed posteriorly, join spermathecae ectolaterally; spermathecae twice the size of ducts, slightly divergent near posterior median notch, angled approximately 45° to meet ducts; diveticula touching mesally, located opposite juncture and dorsal to ducts and spermathecae (Fig. 23). This specimen is tentatively assigned to palpalis until the original specimen is located or more material is collected from the Palo Alto area.

Salticus rubiginus, n. sp.
Figs. 16-17, 32, 42, 47, 59.

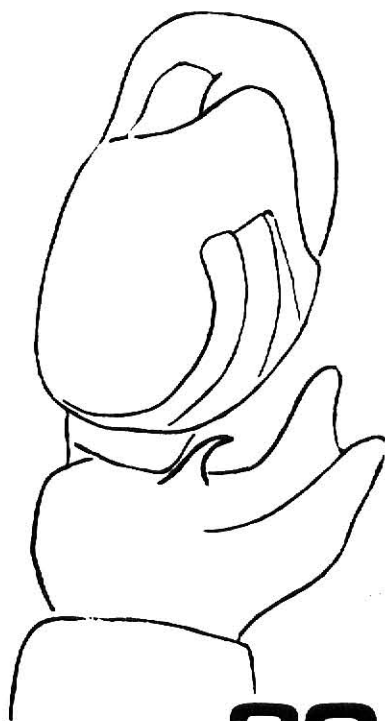
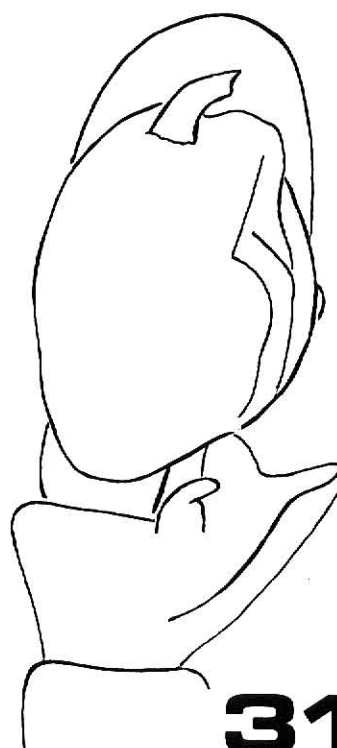
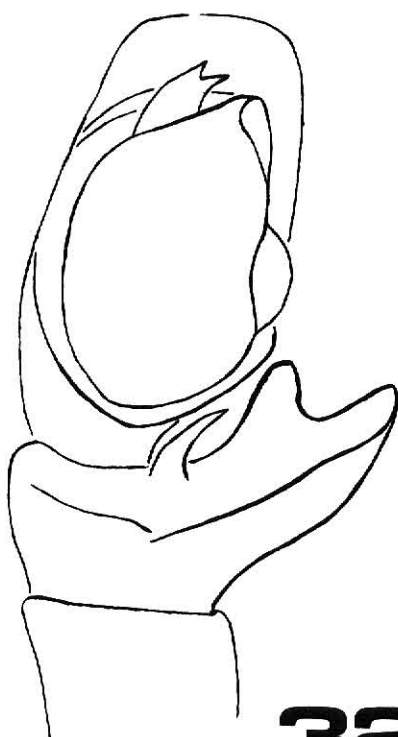
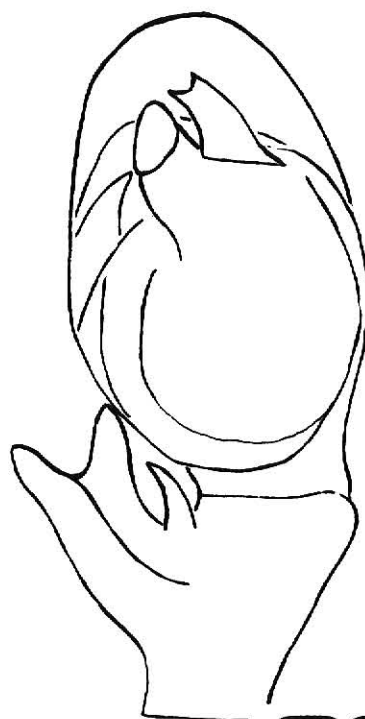
Salticus palpalis, Peckham and Peckham, 1909, Trans. Wis. Acad. Arts and Sci. 16:478. pl. XLII Figs. 10-10a, pl. XLIV, Figs. 7-7a (Misidentification).

Types: Female holotype, CALIFORNIA, Warners Hot Springs, 16-IV-1929, Artemisia tridentata Ass. Temecula 7, Coll. Simonds, in AMNH collection. Female paratype same data as holotype. Male allotype same data as holotype.

Description of female: Carapace covered with magenta and/or green scales, three patches of white scales directly behind

FIGURES 30-33

- 30. tibia and palp - imitatus
- 31. tibia and palp - rostrus
- 32. tibia and palp - rubiginus
- 33. tibia and palp - regalus

**30****31****32****33**

anterior eyes where ALE meet AME, and AME subtouch; clypeus narrow with few white scales and hairs converging over chelicerae; anterior row of eyes slightly recurved; leg I extremely darkened to proximal 1/3 of metatarsus, remainder yellow orange, legs II and III have streaks on femur, remainder yellow, leg IV streaked to proximal tip of metatarsus, remainder yellow; epigynum rectangular, anterior atrial wall under atrial ridge which is well developed, median septum not conspicuous, intromittent orifices set deep into lateral and anterior walls, under atrial ridge which is well developed (Fig. 42), slits convergent posteriorly, angle to meet atrial channel, lateral walls parallel, divergent near posterior notch, channel deep and rounded from posterior notch to atrial ridge; copulatory ducts 2/3 circumference of spermathecae, slightly bowed laterally and conspicuously bent dorsally, spermathecae parallel; diverticula located on the mesal 1/3 and dorsal to juncture between ducts and spermathecae (Fig. 17).

Measurements of 14 mature females: Total length, 4.05-5.15 (4.73); carapace length, 1.75-2.05(1.89); carapace width, 1.2-1.4(1.26); carapace height, .6-.75(.68); leg I length, 2.9-3.6 (3.23); leg II length, 2.0-3.15(2.70); leg III length, 2.85-3.6 (3.23); leg IV length, 4.05-4.5(4.17).

Description of male: Similar to female in coloration and markings, darker; legs darker; apical tibial spine narrow and elongate, acute (Fig. 32); tibial apophysis bifid; embolus bifid.

Measurements of 5 mature males: Total length, 3.45-4.65

(3.89); carapace length, 1.75-2.10(1.87); carapace width, 1.2-1.4 (1.26); carapace height, .6-.7(.67); leg I length, 3.8-4.65(4.15); leg II length, 2.7-3.25(2.92); leg III length, 2.85-3.45(3.18); leg IV length, 3.6-4.01(3.79).

Localities: CALIFORNIA: Inyo, Los Angeles, San Bernardino, Santa Barbara, Riverside Co.

Diagnosis and comments: The deeply set orifices, the parallel lateral walls of the atrium and the deeply bowed and curved copulatory ducts and spermathecae with dorsal diverticula are diagnostic of S. rubiginus. It is apparently most closely related to regalus but the dorsal shifting of the copulatory ducts, coloration, and white scale patterns on the carapace of rubiginus are diagnostic.

Salticus regalus, n. sp.
Figs. 20-21, 33, 44, 47, 58.

Types: Female holotype, CALIFORNIA, 13 mi. west of Winterhaven, Imperial Co., Coll. Vincent Roth, 25-III-1956 Lat. 42 (AMNH). Female paratype, ARIZONA, Imperial Dam, Yuma Co., Coll. R. S. Funk, 28-V-1965. (FCA). Male allotype, CALIFORNIA, Imperial Dam, Imperial Co., Coll. V. Roth, 28-IX-1957, (AMNH). Male paratype, same data as allotype.

Description of female: Carapace densely covered with scales, broad band of white scales behind anterior row of eyes, white scales form an X across the thoracic groove and behind the PLE, remainder of carapace covered with opaque-magenta and/or green scales, ocular quadrangle with ground color blacker around eyes;

anterior row of eyes usually in a straight line, slightly re-curved in one specimen; legs light yellow, leg I darker proximal to tibia; abdomen covered with 3 bands of red-brown hairs and 4 bands of white scales, sometimes with a golden tinge, iridescent scales scattered along borders of white scales and hairs; epigynum rounded, trough-like, anterior wall forms an 80° angle, square shaped, lateral walls form angles of 60° , intromittent orifice slits parallel anteriorly, united posteriorly (Fig. 44); copulatory ducts bowed laterally and dorsally (Fig. 21); spermathecae larger than ducts, also bowed laterally and dorsally, convergent near posterior median notch.

Measurements of 8 mature females: Total length, 3.5-5.3 (4.02); carapace length, 1.5-2.1(1.83); carapace width, 1.0-1.35 (1.18); carapace height, .55-.70(.62); leg I length, 2.4-3.60 (2.96); leg II length, 1.85-3.00(2.52); leg III length, 2.65-3.5 (3.02); leg IV length, 3.35-4.45(3.89).

Description of male: Carapace similar to female; anterior row of eyes recurved; legs light yellow or amber; abdominal hairs a golden brown; tibial apophysis bifid; spine narrow, finger-shaped slightly blunted apically (Fig. 58).

Measurements of 3 mature males: Total length, 4.0-4.8(4.3); carapace length, (1.9); carapace width, 1.25-1.3(1.28); carapace height, .65-.7(.67); leg I length, 4.15-4.58(4.33); leg II length, 2.90-3.13(3.03); leg III length, 3.15-3.3(3.22); leg IV length, (3.85-4.05(3.98)).

Localities: CALIFORNIA: Imperial, San Diego Co.; ARIZONA: Yuma Co.

Diagnosis and comments: The deeply rounded atrium, the bowed and curved copulatory duct (Fig. 21) and the fingerlike ATS (Fig. 56) are diagnostic for S. regalus. It closely resembles rothi in coloration and markings but is apparently most closely related to imitatus (Figs. 19 and 21). The angling of the spermathecae, the carapace markings, the abdominal hair color, and the unique shape of the embolus of imitatus separate these two species.

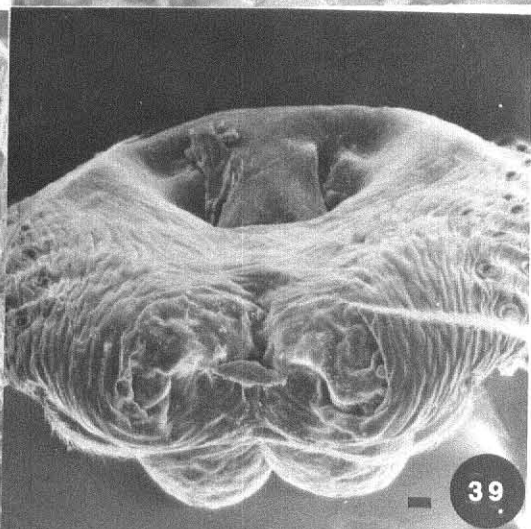
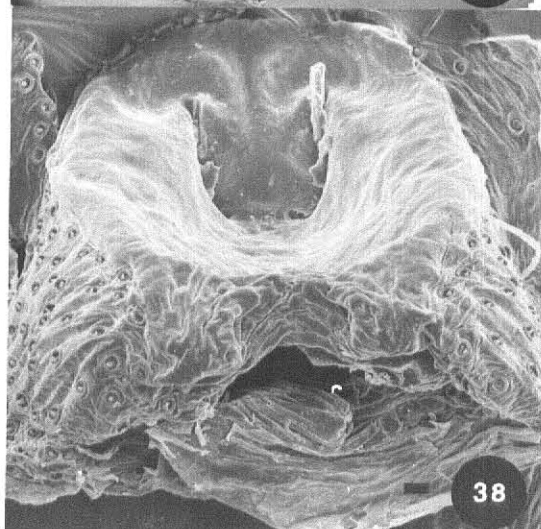
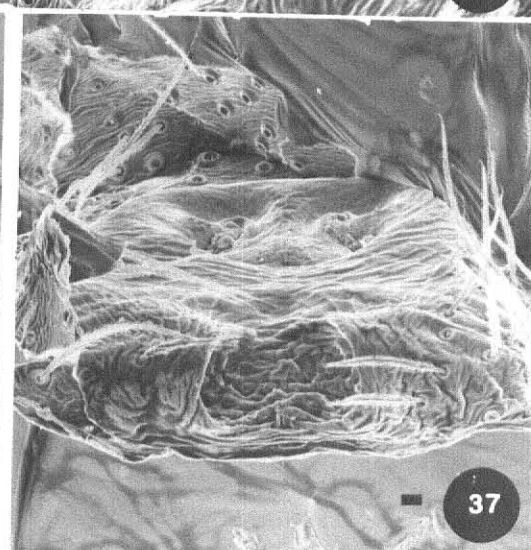
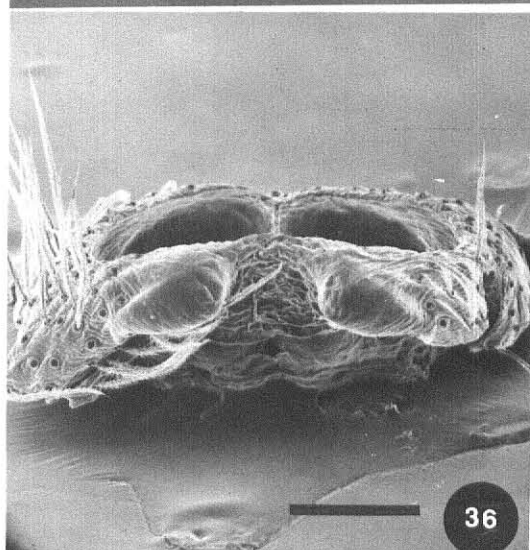
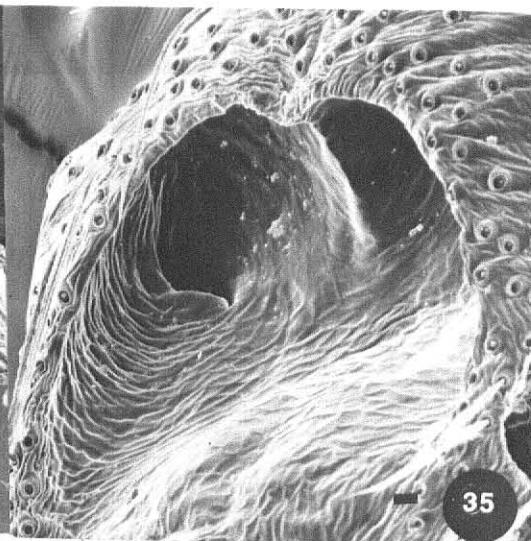
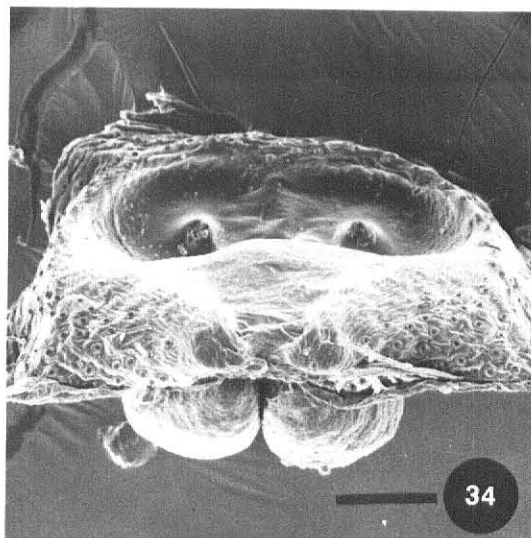
Salticus imitatus, n. sp.
Figs. 18-19, 30, 44, 47, 60.

Types: Female holotype, UTAH, St. George, Washington Co., coll. R. V. Chamberlin. Two female paratypes, St. George, coll. V. L. Tanner, 1920. Male allotype, same data as holotype, Male paratype same data as female paratype. All specimens are in MCZ collection.

Description of female: Carapace orange-brown, ocular quadrangle blacker around lateral eyes, band of white scales extend behind anterior row of eyes, posterior band of very thick scales across middle of carapace, remainder of carapace covered with opaque scales, occasionally producing iridescent magenta-green colors; anterior row of eyes in straight line; legs white amber to orange, without bands or streaks, covered with white scales; abdomen red-brown, similar to palpalis (Banks); epigynum with deep medial groove, upper 1/3 of lateral walls form 45° angle, lower 2/3 form 80° angle (Fig. 18), rim around orifices, each

MICROGRAPHS 34-39

- 34. epigynum - scenicus
- 35. epigynum, hood - austinensis
- 36. epigynum, ventral view - austinensis
- 37. epigynum - rothi
- 38. epigynum - peckhamae
- 39. epigynum - curvispinus



side unites behind the median septum; copulatory ducts narrower than spermathecae, slightly bowed; spermathecae angled at approximately 45° angle to copulatory ducts; diverticula dorsal to anterior tip of spermathecae (Fig. 19).

Measurements of 5 mature females: Total length, 3.25-4.80 (3.9); carapace length, 1.65-1.90(1.76); carapace width, 1.05-1.25(1.15); carapace height, .60-.75(.63); leg I length, 2.65-3.20(2.92); leg II length, 2.5-2.75(2.58); leg III length, 2.85-3.10(2.98); leg IV length, 3.35-4.05(3.72).

Description of male: Carapace iridescent, white band of scales behind anterior row of eyes; clypeus and legs resemble female; abdomen with golden brown hairs between white bands of scales; tibial apophysis bifid; embolus truncate, ectal edge notched (Fig. 30).

Measurements of 2 mature males: Total length, 4.4-4.8(4.6); carapace length, 1.75-1.9(1.82); carapace width, 1.15-1.35(1.25); carapace height (.65); leg I length, 3.1-4.65(3.88); leg II length, 3.05-3.25(3.15); leg III length, 3.75-4.0(3.88), leg IV length, 3.4-4.0(3.7).

Localities: UTAH: Washington Co.

Diagnosis and comments: The embolus of this species is diagnostic (Figs. 30 and 58). S. imitatus closely resembles rubiginus in coloration, but it is apparently most closely related to regalus. The spermathecae have rotated at the point of attachment to the copulatory ducts as they angle (45°) dorsally, and the diverticula are apical (Fig. 19).

The atrium of imitatus is more flattened than in rubiginus or regalus; the orifices are exposed ventrally without a well developed ridge (Fig. 45).

Salticus rostrus, n. sp.
Fig. 31

Type: Male holotype, CALIFORNIA, Fresno, Fresno Co., IX-1952, coll. L. Saylor in the AMNH collection. No female.

Description of male: Carapace orange-brown, narrow, with white band of scales behind anterior row of eyes, opaque scales cover remainder of dorsum; anterior row of eyes straight; clypeus narrow; legs II-IV light yellow brown, streaked laterally through proximal third of tibia, leg I darker, brown, streaked to apical 1/3 tibia; abdomen with three bands of golden brown hairs separating 4 bands of off-white and opaque scales; embolus bifid; tibial apophysis bifid; apical tibial spine beak shaped and hooked towards apophysis (Fig. 31).

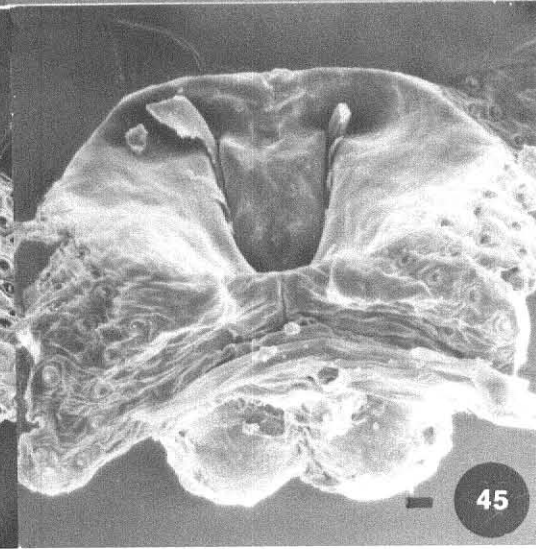
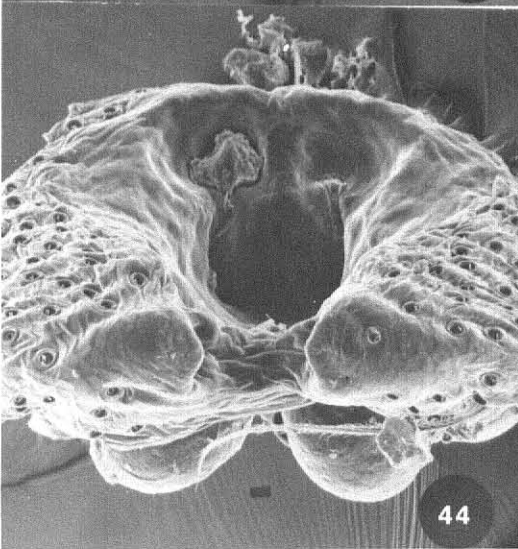
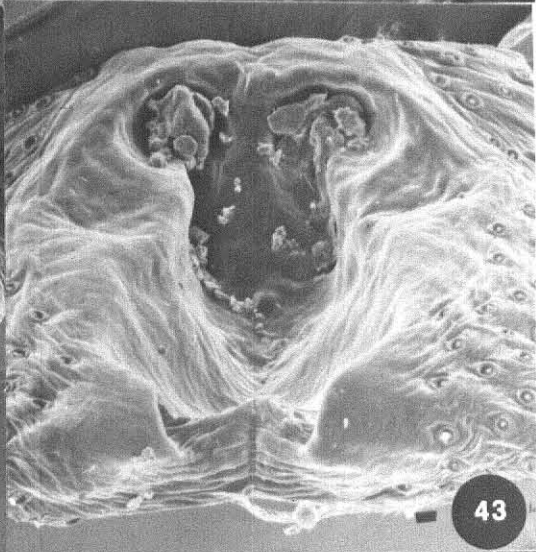
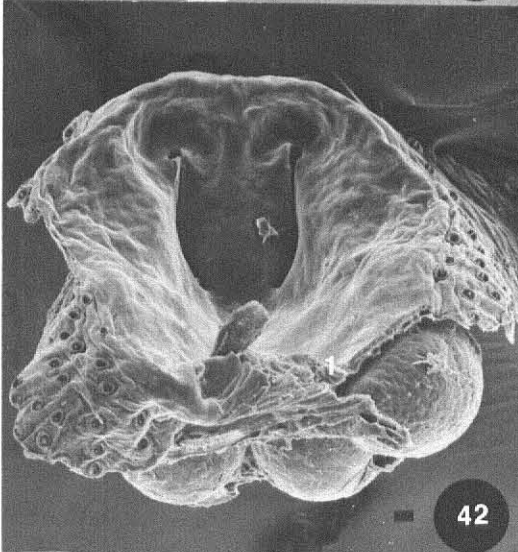
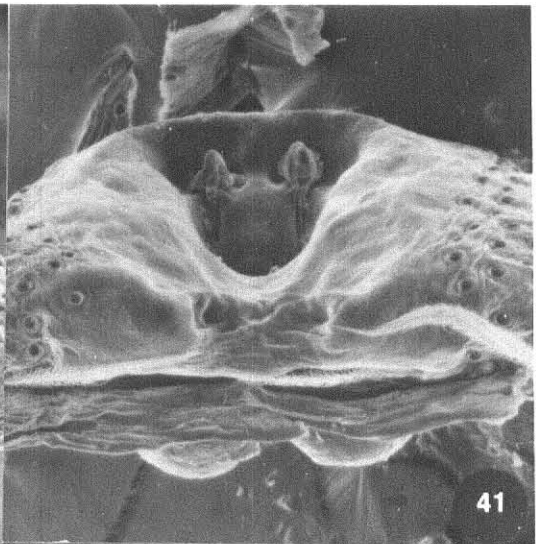
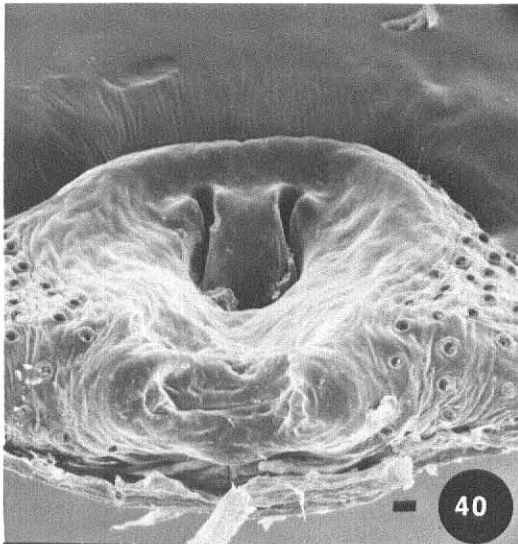
Measurement of male: Total length 3.85; carapace length, 1.7; carapace width, 1.1; carapace height, .6; leg I length, 3.5; leg II length, 2.68; leg III length, 2.95; leg IV length, 3.5.

Locality: CALIFORNIA: Fresno Co.

Diagnosis and comments: The curved, beak shaped ATS and the bifid embolus and tibial apophysis separates rostrus from most other species. S. curvispinus and rothi have a similar ATS but the embolus is acute. S. rostrus is apparently most closely related to curvispinus. They share the bifid tibial apophysis and hook shaped ATS.

MICROGRAPHS 40-45

- 40. epigynum - purpurus
- 41. epigynum - alveraae
- 42. epigynum - rubiginus
- 43. epigynum - regalus variety,
San Diego Co., CA
- 44. epigynum - regalus (type),
Imperial Co., CA
- 45. epigynum - imitatus



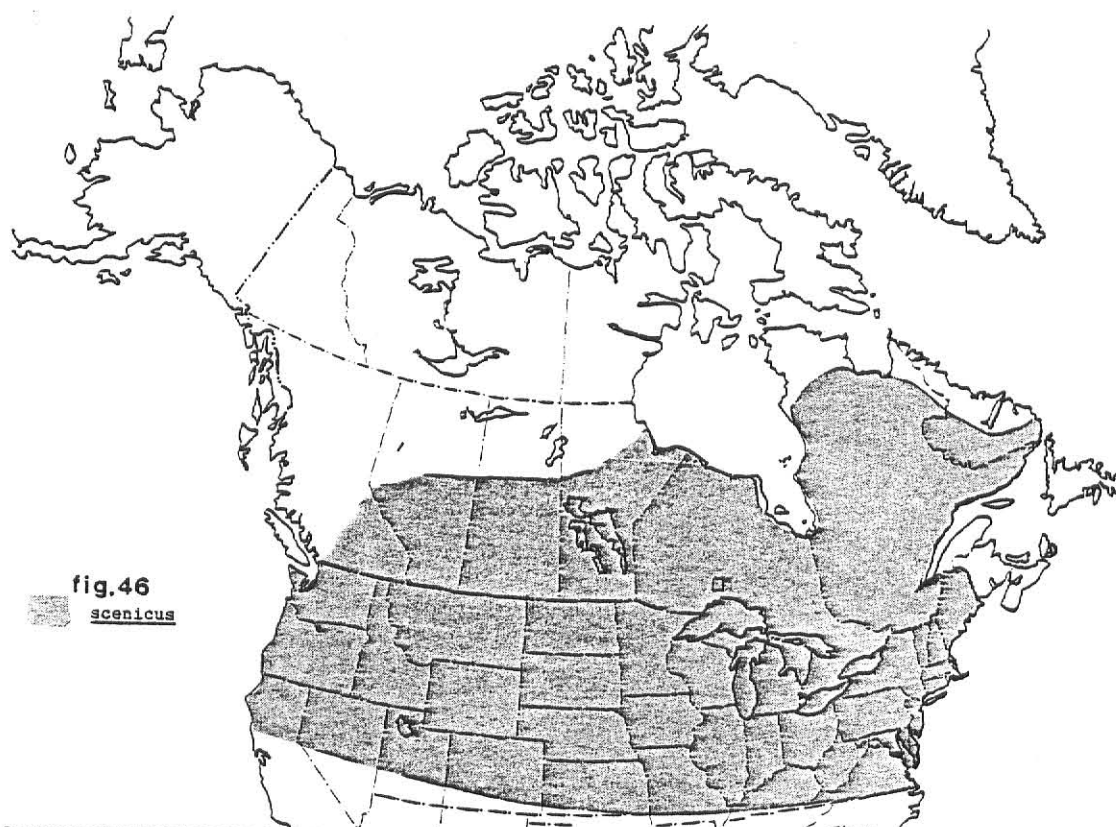


fig. 46

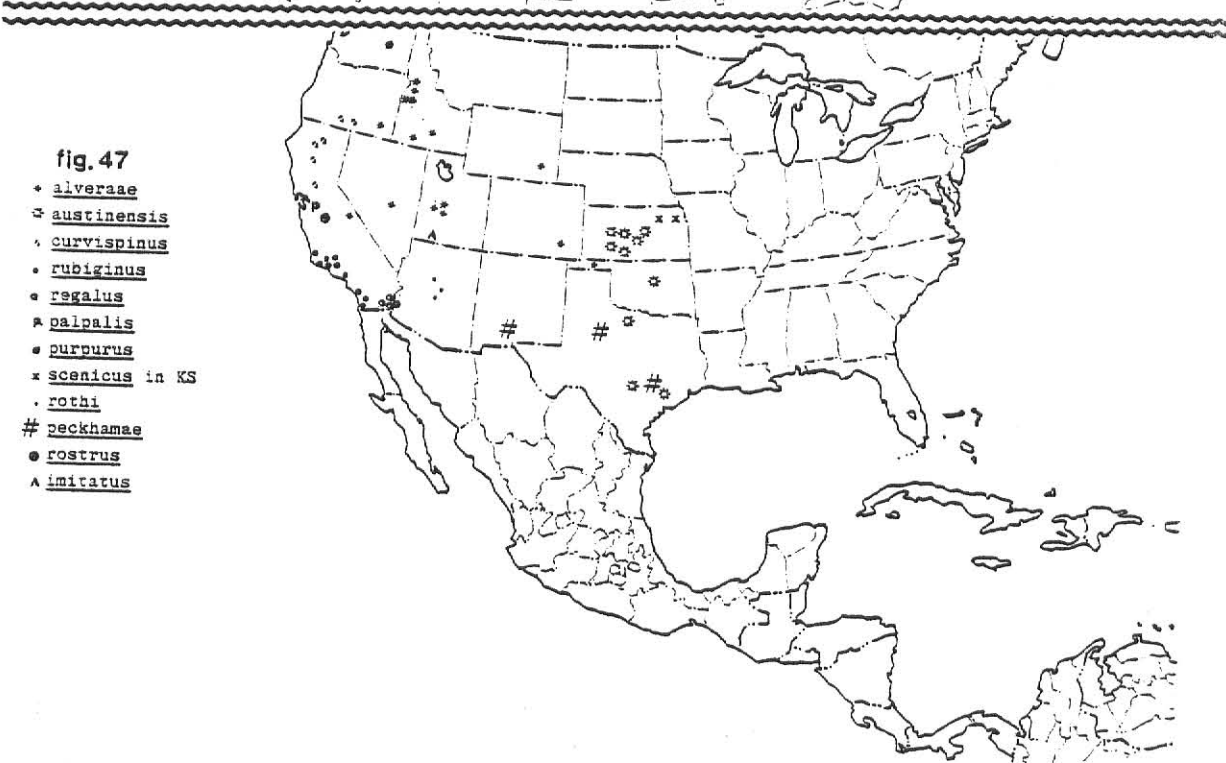
scenicus

fig. 47

- + alverae
- G austinensis
- x curvispinus
- rubiginus
- regalis
- p palpalis
- purpureus
- x scenicus in KS
- rothi
- # peckhamae
- rostrus
- A imitatus

ACKNOWLEDGEMENTS

Many persons assist in a revision; I hope to include all major contributors at this point. Special recognition is due H. D. Blocker of the Entomology Department of Kansas State University for his advice and review of this manuscript. His timely suggestions have made a considerable improvement in the final form of this manuscript. R. J. Sauer of the University of Minnesota who assisted me through the first half of this study, and R. J. Elzinga of the Entomology Department of Kansas State University whose opinions and comments were beneficial. T. Barkeley of the Division of Biology also made valuable suggestions. Other members of Kansas State University to whom I owe thanks are G. Milliken (Statistics), and the following members of the Entomology Department; A. Broce, W. A. Ramoska, S. Welch, J. W. Johnson, and J. Krchma.

I also gratefully acknowledge those who provided material and/or assistance. Symbols indicated are used in text to refer to these scientists or the their institutions;

Dr. P. Ashlock, University of Kansas (KU)

Dr. B. E. Cutler, St. Paul, Minnesota

Dr. C. D. Dondale, Entomology Research Institute (ERI)

Dr. W. A. Drew, Oklahoma State University (OSU)

Dr. G. B. Edwards, Division of Plant Industry, Florida
Department of Agriculture (FCA)

Dr. S. Frommer, University of California, Riverside (UCR)

Dr. C. Griswold, University of California, Berkeley (UCB)
Dr. W. J. Gertsch, Portal Arizona (AMNH)
Dr. D. H. Horner, Midwestern University (MWU)
Dr. D. H. Kavanaugh, California Academy of Sciences (CAS)
Dr. H. Levi, Museum of Comparative Zoology (MCZ)
Dr. W. B. Peck, Central Missouri State College (CMS)
Dr. N. I. Platnick, American Museum of Natural History (AMNH)
Dr. E. Smith, Field Museum of Natural History, (FMNH)
Dr. R. J. Snetsinger, Pennsylvania State University (PSU)

LITERATURE CITED

- Bonnet, P. 1945-1961. Bibliographia Araneorum I-III. Imprimerie Douladoure, Toulouse.
- Comstock, J. H. 1910. The palpi of male spiders. Ann. Ent. Soc. America 3:161-185.
- Comstock, J. H. 1940. The spider book. Vail-Ballou Press, N.Y. pp. 672-684.
- Galiano, M. E. 1963. Especies Americanas de Salticidae de E. Simon. Physis, 23(66:275).
- Levi, H. 1965. Techniques for the study of spider genitalia. Psyche 72(2):152-158.
- Peckham and Peckham 1909. Revision of the Attidae of North America, Trans, Wisc. Acad. Sci. 16:475-479.
- Roewer, C. F. 1952-1954. Katalog der Araneae I-II. Bremen and Brussels.
- Schick, R. X. 1965. The crab spiders of California (Araneida, Thomisidae). Bull. Amer. Mus. Nat. Hist. 129:1-180.
- Shear, W. A. 1967. Palpi of male spiders. Breviora 259:21.
- Snedecor & Cochran. 1939. Statistical methods, Iowa State University press.
- Sweet, R. A. 1981. Revision of the genus Salticus (Araneae, Salticidae) north of Mexico. Masters Thesis, KSU.
- Vogel, B. R. 1967. A list of New North American spiders (1940-1966). Mem. Amer. Ent. Soc. 23:1-186.

Part II:

APPENDIX A

Review of Literature

The genus Salticus was originally described by Clerck in 1757 as the genus Araneus, species scenicus. Latreille established the genus in 1804 and named scenicus the type-species. Presently Salticus contains 4 nearctic species. S. scenicus was first reported from the United States by Hentz (1832) as Epiblemum faustum, a new genus and species, George and Elizabeth Peckham synonymized the genus in 1909. Previously (1896) they described albo-cinctus in the genus Epiblemum. Salticus albocinctus was first used by C. L. Koch (1846) for a new species of an ant mimicking spider now known as Myrmarachne albocinctus (Koch). According to Bonnet (1958) the name Salticus albocinctus was applied to 3 different species, identified here by author, they are: Banks (n. Koch) - Myrmarachne hentzi (Banks); Koch = Myrmarachne albocincta (Koch); and Simon - Salticus austinensis Gertsch. This created the ant mimicking image that Salticus maintained until recently (Kaston 1948, Prosynski 1976, Hill 1979). W. J. Gertsch (1936) discovered the synonymy created when Epiblemum albo-cinctus was placed in the re-established genus Salticus in 1909 and subsequently renamed the species as austinensis. No male genitalia were illustrated. Chamberlin and Woodbury (1924) thought that they had collected albocinctus (Peckham) as they listed it among spiders of Utah but had actually collected a new species, imitatus. S. peckhamae, named

by Cockerell (1897) in honor of Elizabeth Peckham, was mistakenly placed in the genus Icius. True Icius are not thought to be present in the New World (Prosynski 1976). True peckhamae females have not been collected outside of the Mesilla Park, New Mexico area where Cockerell collected the original specimen. The Peckhams moved peckhamae into Salticus in 1909. The last of the present species of Salticus is S. palpalis Banks, 1904, a monotypic species, specimen presumably lost, from Palo Alto, California. Peckham and Peckham redescribed palpalis in 1909 from specimens collected in Claremont, California. These specimens are a new species as they do not resemble the original description of Banks; the markings and colors are different. Chamberlin listed it collected from Imperial Co., California (1929) in another list. He had actually collected a new species, regalus.

Many (> 12) faunal lists have been published and include Salticus or speculation to the presence of Salticus, but I found them inaccurate and therefore do not include them in this report. Most of the biological literature concerns scenicus. The best references, in my opinion, are B. J. Kaston (1957), F. O. Pickard-Cambridge (1952), and Bristowe (1958).

More recent Palearctic revisionary work have been done in Communist Europe. The only European immigrant into the New World thus far discovered is S. scenicus. The biology of scenicus is also commonly found in European literature.

APPENDIX B

Morphology and Measurements

The epigynum has characters not previously used in Salticid taxonomy. Some new terminology is needed to describe the character units of the atrium produced by the depression of the sclerotized atrial shield which protects the spermathecae and undoubtedly serves as a guide for entrance of the male embolus. The external features are the result of the separation, elongation and rotation of the internal structures. The channel formed by the depressed shield produces a lateral wall, a floor or groove, and an anterior atrial wall (with or without a median septum). The orifices are always in the anterior 1/3 of the atrium. The median septum is formed by the receded genital orifices. The intromittent orifices may take the form of circular pits, pits with narrow slits diverging posteriorly, and pits with slits uniting medially, resembling a U (Fig. 11).

The internal sclerotized structures are the anterior seminal ducts, the spermathecae (seminal receptacles) anterior and lateral to the posterior notch, and the ball shaped diverticula anterior to the vagina. These may be enlarged, bent, angled, divergent, or convergent in different species and may be described as rectangular-shaped (Fig. 38), rounded bathtub-shaped (Fig. 20), or heart-shaped (Fig. 1). S. austinensis has a hoodlike structure over the orifices (Fig. 35), others possess a ridge or rim (Figs. 39-44).

The dorsal view of the epigynum was obtained by removing the epigynum from the body (Levi, 1969) and dissolving the fat tissue in a 10% solution of KOH.

In order to better illustrate this genus, it was necessary to alter some carapace measurements of Salticus from those of Galiano (1963), Figs I and II; and legs III and IV were measured over the prolateral surface rather than the retrolateral surface Galiano used for all legs. Also, measurements of the ventral surface of the coxae and trochanter were added to the total leg length in this study.

Appendix Fig. I, dorsal view of body.

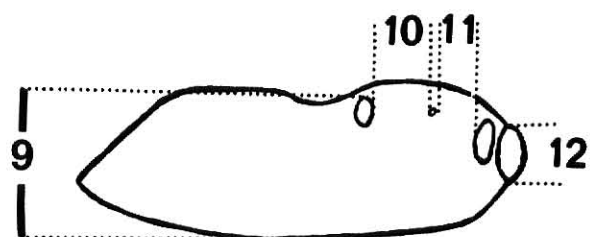
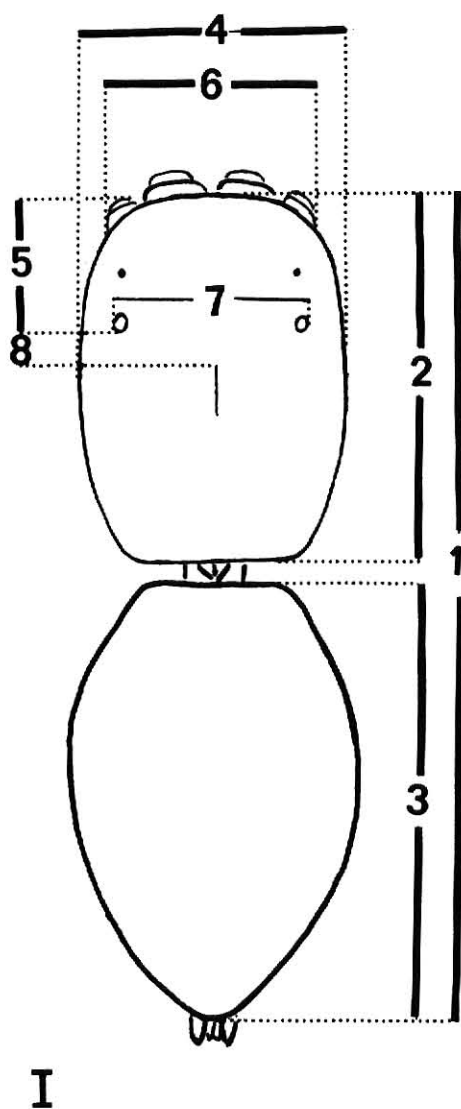
1. total length
2. carapace length
3. abdomen length
4. carapace width
5. ocular quadrangle
6. width anterior eyes
7. width posterior eyes
8. distance from PLE to thoracic groove

Appendix Fig. II, right lateral view of body.

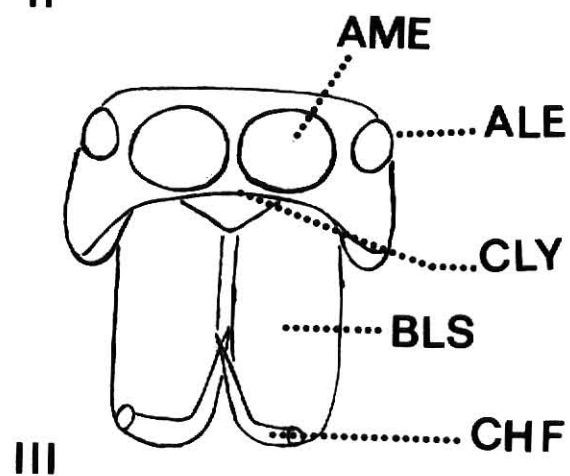
9. carapace height
10. PLE-PME, distance between
11. AME-ALE, distance between
12. Diameter AME.

Appendix Figs. III-V. III. frontal view of body. IV. retro-lateral view of left leg I. V. left lateral view of S. scenicus.

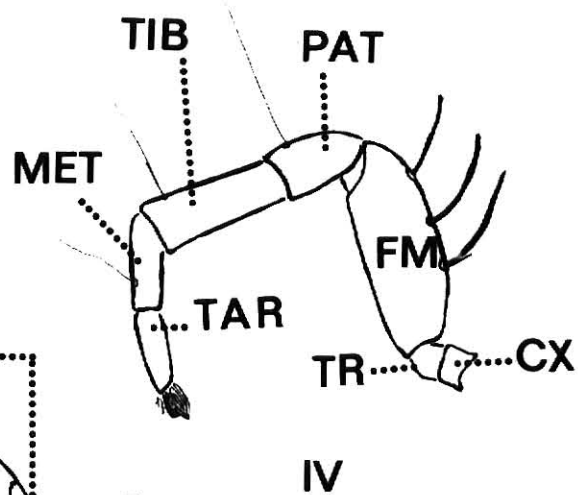
A, abdomen; ALE, anterior lateral eye; AME, anterior median eye; AS, anterior spinneret, BLS, book lung slits; BSC, basal segment of chelicerae; C, carapace; CHF, chelicerae; CLY, clypeus; CL-I, coxa of leg I; CX, coxa of pedipalp; EF, epigastric furrow; EP, epigynum; FM, femur; MET, metatarsus; PAT, patella; PLE, posterior lateral eye; PME, posterior median eye; PS, posterior spinneret; PT, pars thoracica; TAR, tarsus; TB, tibia; TG, thoracic groove; TR, trochanter of leg.



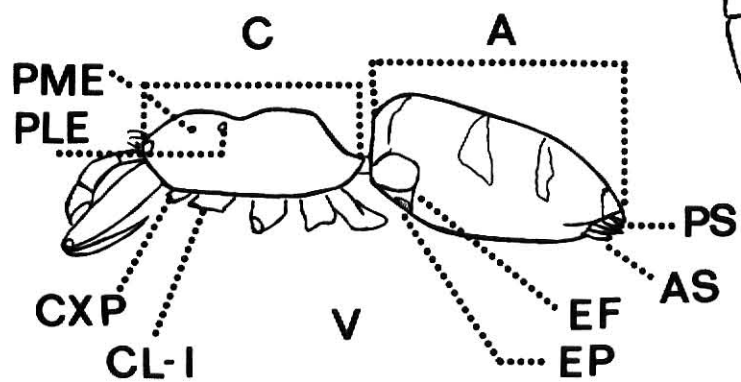
II



III

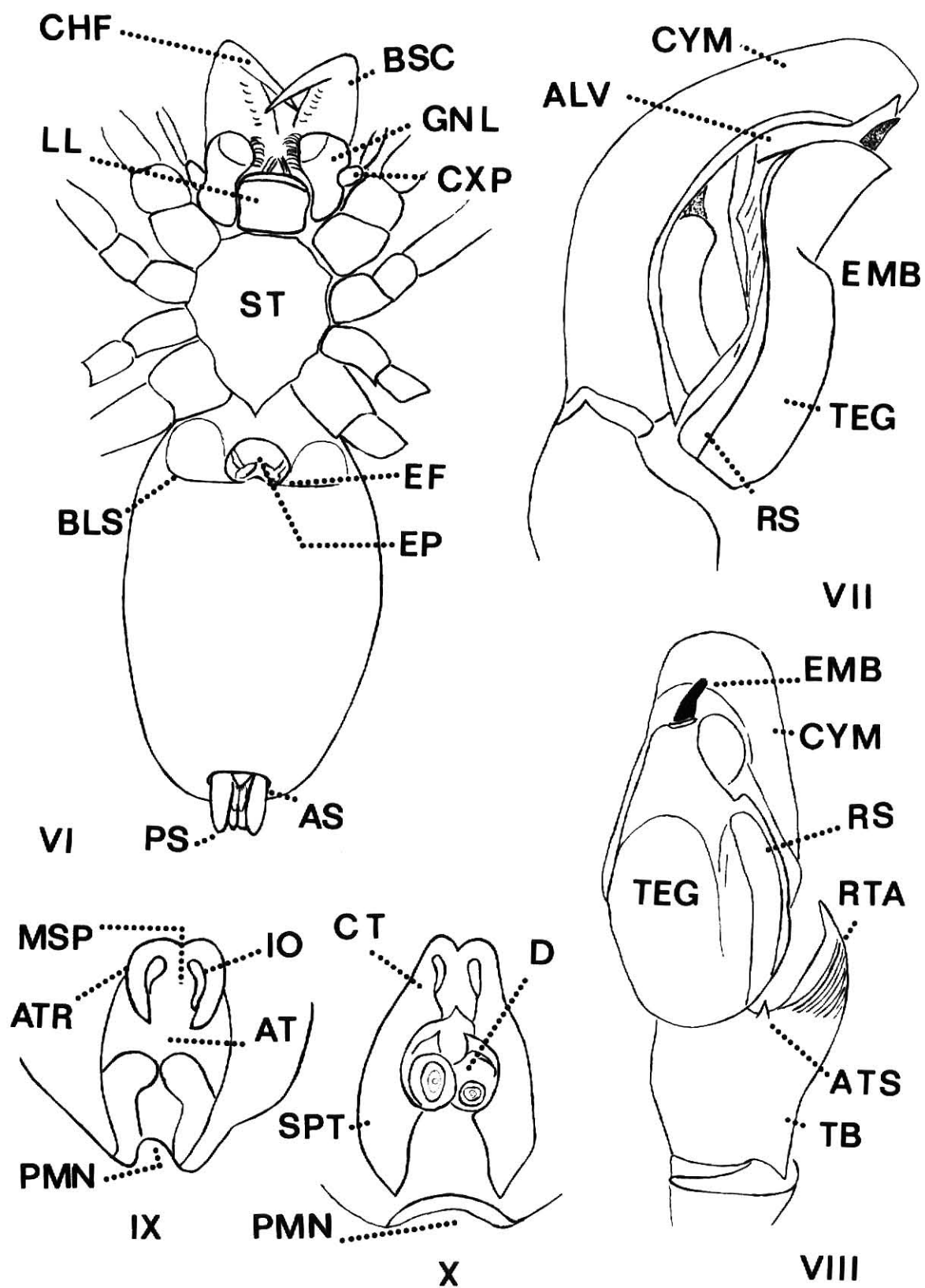


IV



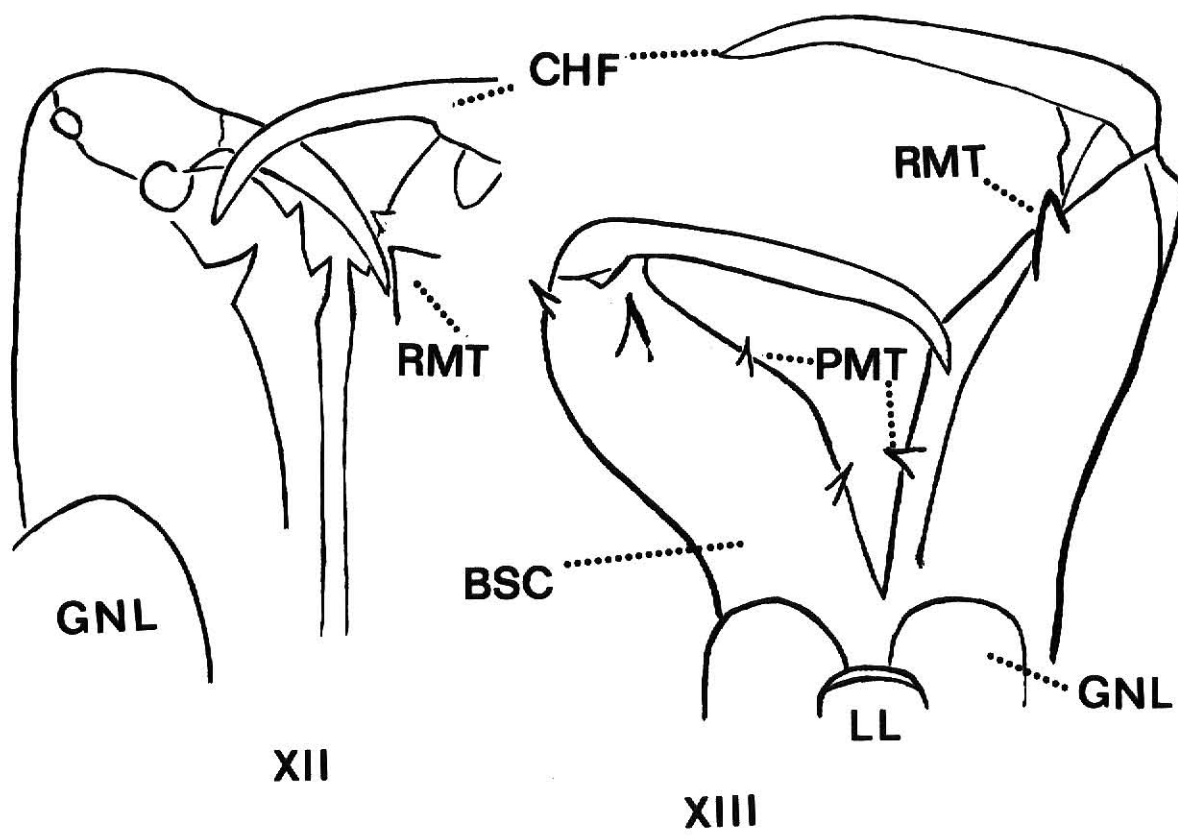
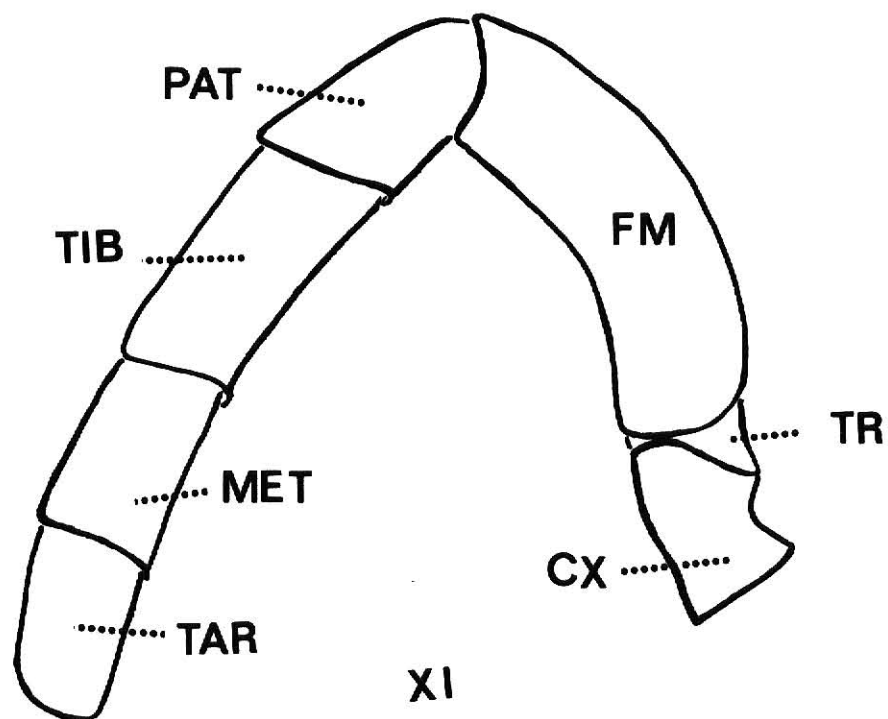
Appendix Figs. VI-X. VI. ventral view of body. VII. mesolateral view of male palp and tibia. VIII. ventral view of male palp and tibia. IX. ventral view of epigynum. X. Dorsal view of epigynum.

ALV. alveolus; AT, atrium; ATS, apical tibial spine; AS, anterior spinneret; BLS, book lung slit; CD, copulatory duct; CHF, basal segment of chelicera; CXP, coxa of pedipalp; CYM, cymbium; D, diverticulum, EMB, embolus; EF, epigastric furrow; EP, epigynum; GNL, gnathocoxal lobe; IO, Intromittent orifice; LL, labium; MSP, median septum, PMN, posterior median notch; PS, posterior spinneret; RS, receptaculum seminis; RTA, retro-lateral tibial apophysis; SPT, spermatheca; ST, sternum; STEG, subtegulum; TB, tibia; TEG, tegulum; TR, trochanter.



Appendix Figs. XI-XIII. XI. pedipalp of female scenicus.
XII. chelicerae of female scenicus. XIII. chelicerae of male
scenicus.

BSC, basal segment of chelicera; CHF, chelicer al fang; CX, coxae;
FM, femur; GNL, gnathocoxal lobe; LL, labium; MET, metatarsus;
PAT, patella; PMT, promarginal tooth; RMT, retromarginal tooth;
TAR, tarsus; TIB, tibia; TR, trochanter.



APPENDIX C

Systematic Analysis

The objective of this portion of the study is to compare groupings produced through a quantitative methodology to an intuitive conclusion obtained through the collection and analysis of all data.

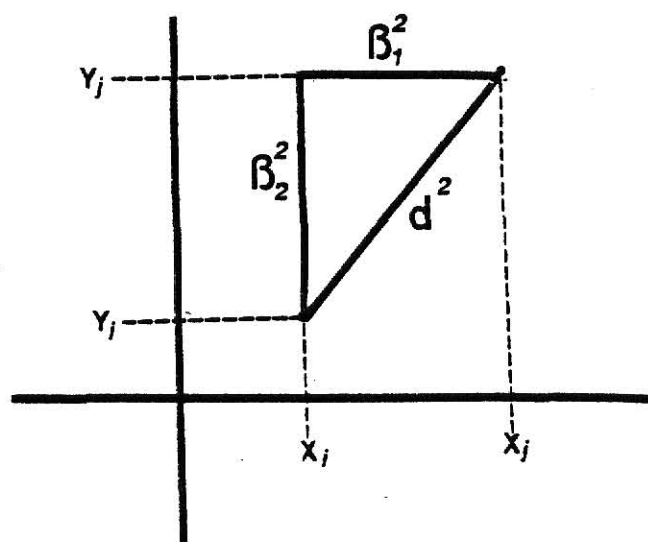
A phenetic analysis has been constructed using concepts from Ashlock's unpublished non-computer method of cluster analysis (Personal Communication) and from Sneath and Sokal (1973). Some precautionary notes were taken from Mayr (1969), and the study proceeded in the following sequence: 137 character units from 43 character states were selected for specific and generic level differences; Galiano's (1963) technique of measuring Salticid spiders was used as a guideline to traditional characters used by contemporary Salticid authors, while a literature review provided insight into the classic characteristics and current understanding of the genus Salticus. A list of characteristics considered valid for the separation of species of Salticus which in turn would separate individual semaphoronts was compiled and specimens were divided into four taxa: scenicus, albocinctus (austinensis), peckhamae and palpalis. Measurements were taken and appearance of structures was recorded on a data sheet (Table 1) which in turn were converted into the character states and character units listed (Table 2). Non measureable characteristics were recorded as present (coded as 1) or absent (coded as 0).

Weight was not placed on any character state, therefore all units were assigned equal value. In this manner all possible bias was hopefully eliminated.

A phenetic analysis compares the characters of taxa so that a measure of overall similarity between each possible pair is obtained by using a Euclidean distance, Fig. XIV.

Fig. XIV

Model of Euclidean
Distance



$$(X_i - X_j)^2 + (Y_i - Y_j)^2 = d^2$$

Characters are coded and assembled into a data matrix. A coefficient of similarity is calculated by comparing all of the characters of each taxon with those of each other taxon in the data matrix. These results are assembled into a similarity matrix and subsequently clustered and mapped. The process involves calculating the mean and standard deviation of units of each character state, then re-expressing these states as deviations from the mean in standard deviation units (Sneath and Sokal, 1963:145). The variance of each character state therefore is equal to 1. The formula used is $\sum_{i=1}^n (X_i - X_j)^2$. It was necessary

to separate the males and females to analyze by computer due to the overwhelming positive presence of the sex character unit.

Using a SAS proc cluster NCL=16 command for SXF, the computer produced a phenogram which included the separations that I made intuitively and 5 additional separations (usually clusters of one individual). The results of the female cluster analysis are as follows:

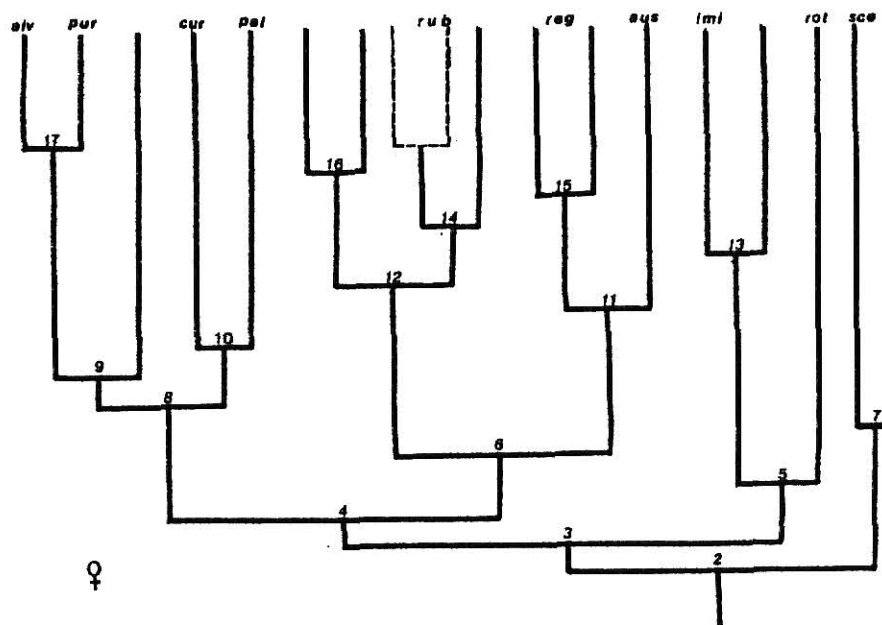


Fig. XV Female Phenogram

Analysis of Fig. XV. In the above phenogram, scenicus splits away at 2 (the number represents the "number of cluster" taken from the SAS cluster map); Scenicus split again at 7 but this

was interpreted as infraspecific difference or error in consistency of coding. The second division was produced at 3, the main branch to the left and a small branch to the right which includes rothi. S. rothi splits from imitatus at 13. The right branch at 5 is a male rothi added to test the reliability of the computer.

The left branch splits into two groupings at 4, the peckhamae group to the left and species I grouped into the austinensis group to the right. This group splits at 6 into the rubiginus forms to the left and austinensis and regalus to the right. Some infraspecific splits occur at numbers 14, 15 and 16. In general these splits indicate variations that I discovered in this species during measurements, but more material (especially males) are needed to interpret the cause and depth of the differences. The left branch at 4 splits again at 8 into the final clusters. The right branch breaks into curvispinus and palpalis at 10. The specimen considered to be palpalis could be out of place at this point due to its lack of measureable characteristics and the fact that only one specimen is included in this cluster. The left branch splits into an odd form from Kern Co., California at 9 and the alverae and purpurus forms at 17. It was for these latter forms that I extended the map to 17. Fortunately most of the unacceptable variations occurred after 12. Only the Kern Co. variety at 9 and the scenicus variation at 7 occur below 10. I found this clustering in accord with my opinions of the females.

Using a SAS proc cluster NCL=12 command for SXM, the computer produced the following map:

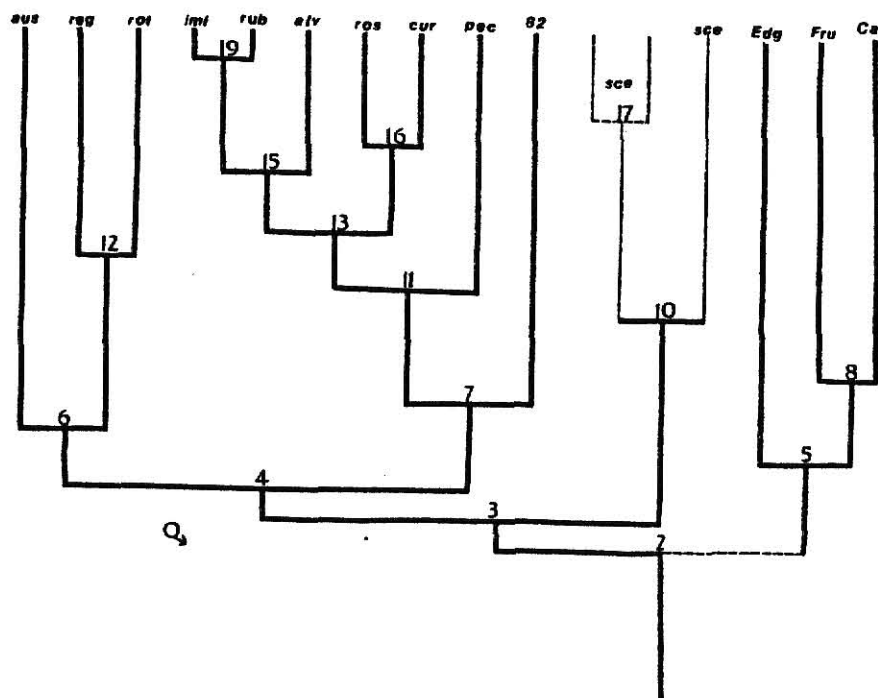


Fig. XVI . Male Phenogram.

Analysis of Fig. XVI. Variations occur early in this cluster analysis in that 3 unacceptable species clusters are formed to the right of the mainline split at 3. These branches contain only one individual each and include such suspect differences as the lack of measurements for legs I and II. Therefore, the main split considered here will be the split at 3 into scenicus and the major branch to the left. Even scenicus demonstrates some measureable differences at 10 and 17. The left branch then divides into the austinensis group (left) and peckhamae

group (right) at number 4. The left branch splits early at 6 into austinensis and again (much later) at 12 into regalus and rothi. The right branch split at 7 into a questionable form from Nevada listed here as 82 and the main line of peckhamae. S. peckhamae splits first at 11 followed by the mainline split at 13. The right branch of curvispinus and rostrus separate at 16 while the left branch divides into alverae at 15 and rubiginus and imitatus at 19. If we accept this phenogram as being accurate I believe that parallelism is being demonstrated since the forms at 19 plus rostrus are of the rufus hair and white scale varieties while the others are species possessing opaque scales with no bands of hairs. My main disagreement with this phenogram is the fact that several aberrant forms occur early (2, 5, 7, 8 and 10) and that alverae is associated with rubiginus and imitatus at 13. By accepting the possibility of parallelism and ignoring the split at 2 and 7 this phenogram can also be accepted as informative.

My interpretation of the phylogeny of the genus Salticus is as follows:

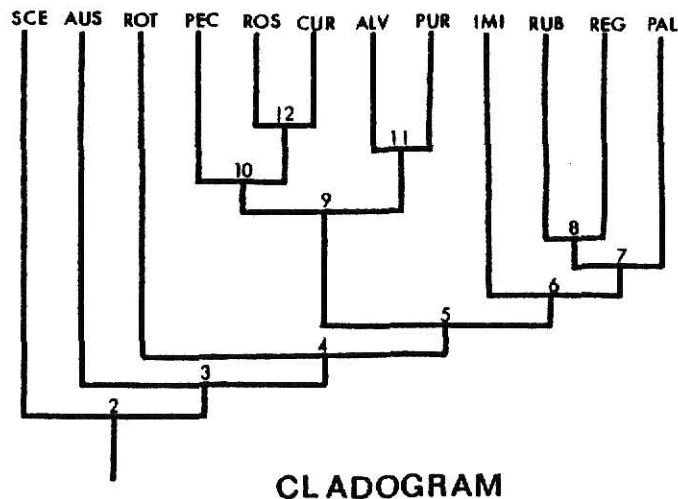


Fig. XVII Cladogram

Analysis of Fig. XVII. I base the phylogeny primarily on the development of the spermathecae, copulatory ducts, embolus, tibial apophysis and the apical tibial spine. Numbers are added to the dendrogram for convenience of discussion, they indicate sequence of character occurrence not a measure of time. Accepting the ancestral spermathecae to be more like that of Fig. 2 (scenicus) and the tibial apophysis to be similar to that of Fig. 50, the interpretation continues as follows: scenicus splits first at 2 followed by the unique austinensis at 3, and the main branch at 4. Again, one species, rothi splits from the main branch at this point represented by a slightly bifid, truncate apophysis and hooklike ATS. Another major split occurs at 5. The right branch contains palpalis and the left contains peckhamae. S. imitatus with its apomorphic embolus and rotated spermathecae split from palpalis at 6 and rubiginus and regalus split from it at 7. They split from each other at 8. The left branch of the number 5 split divides at 9 into what appears to be a more plesiomorphic group of peckhamae, curvispinus and rostrus, and the more apomorphic group of alverae and purpurus.

The major change in form appears to have developed in the direction of rothi which has influenced the transformations in the faunal splits at 5. I propose a major split at this point, seen in the dendrogram, to include species with copulatory ducts converging and touching at the apex; with spermathecae rounded and parallel, or bowing and curving; and diverticula dorsal to medially located at the juncture of the ducts and spermathecae,

usually touching mesally (Figs. 17, 19, 21 and 23). They usually have a mixture of hairs and scales to produce their markings and patterns. For the males of this group the tibial apophysis is bifid; the apical tibial spine is narrow, elongate, and acute at the apex; and the embolus is usually bifid.

I split imitatus at branch 6 from rubiginus and regalus due to its autapomorphic embolus (Fig. 58) and the rotated spermathecae (Fig. 19). The left branch at 5 is a group that I refer to as the Peckhamae group. This group varies less drastically from the ancestral form. The spermathecae are more rounded, parallel, and closer medially; the copulatory ducts are touching or fusing at the apex (Figs. 12 and 14); and the tubes appear like one unit. The diverticula are usually located dorsally. I split the 9 branch into forms having fused copulatory ducts, dorsal diverticula and some depth to the atrium (apomorphic characters).

The absence of males for palpalis and purpurus and the female rostrus make it difficult to determine placement in this scheme; however, I have separated palpalis from rubiginus and regalus at 7, rostrus from curvispinus at 12, and purpurus from its closely related alverae at 11.

The phenograms produce a relationship obtained from a similarity coefficient and a similarity matrix calculating all possible combinations of unweighted characters. The cladogram is produced from weighted characters and shared apomorphic relationships. Differences in the dendrograms probably occur for

those reasons. Having phenetically clustered the specimens of this study into the same 12 taxa gives me more confidence in my intuitive designations.

A discriminant analysis and further quantitative methods of analysis need to be made to solidify the clustering and to correct possible errors in the phenogram, but these tests will need to be done at a future time and in a future study. Additional information (ie. protein analysis, etc.) could serve to strengthen and improve this analysis. However, the results of this study show a positive correlation between the two systems of taxonomic analysis.

APPENDIX C

Table 1
Data Sheet

I. Specimen: my det. _____
 NUMBER _____ from _____ det. _____ by _____
 collector _____ date _____ ecology _____

II. Measurements:
 total length _____ PME to ALE _____
 carapace length _____ PME to PLE _____
 abdomen length _____ PLE to Estria _____
 Ocular Quad. _____ Width center carapace _____
 Height carapace _____ Width Ant. Eyes _____
 Face _____ Width Post. Eyes _____
 Front: sides _____ Ant. Eyes (procurved, recurved,
 Diam. AME=___ ALE=___ PLE=___ straight) _____
 Clypeus height _____ Endites _____
 Labium _____ Sternum _____
 Chelicerae _____

Legs.

I.	II.	III.	IV.	
Cx.	Cx.	Cx.	Cx.	
Tro.	Tro.	Tro.	Tro.	Palps
Fem.	Fem.	Fem.	Fem.	_____
Pat.	Pat.	Pat.	Pat.	_____
Tib.	Tib.	Tib.	Tib.	
Met.	Met.	Met.	Met.	
Tar.	Tar.	Tar.	Tar.	

Leg ratio _____ Leg coloration _____
 Thickness compared _____
 Spines: Leg III: _____ Leg IV: _____
 Legs I & II _____
 Spinnerets: _____

III. Coloration: _____
 Carapace: dorsal _____
 Abdomen: dorsal _____
 ventral _____

IV. Genitalia: _____ Other Observations: _____

APPENDIX C

Table 2
Character Code

VAR card (CS) = character state; unmarked message
column is the unit character of the character state

SID (1-4) Specimen identification number; the first number
indicates if specimen is from a single vial.
a = 0, b = 1, c = 2, d = 3, e = 4

SEX

SXM (7) male spider
SXF (8) female spider
CAR (10-13) carapace length (CS)
ABD (15-18) abdominal length (CS)
TOT (20-23) total body length (CS)
HGT (25-27) height (CS)
OCQ (29-31) length of ocular quadrangle (CS)
PEA (33-35) distance of gap between posterior median
eyes and anterior lateral eyes (CS)
PEP (37-39) distance of gap between posterior median
eyes and posterior lateral eyes (CS)
WDH (41-44) width of carapace (CS)
WAE (46-49) width of anterior eyes, measured from
the lateral border of right eye to lateral
border of left eye (CS)
WPE (51-54) width of posterior row of eyes (CS)

CURVATURE OF ANTERIOR ROW OF EYES FROM FRONTAL VIEW (CS)

CER (56) recurved
CES (57) straight
CLH (59-60) height of the clypeus, measured from the
edge of the carapace to the ventral border
of the AME (CS)

EPIGYNAL SHAPE (62-64) (CS)

CHR (62) heart shaped atrium
CRC (63) rectangular shaped atrium
COV (64) rectangular ovoid shaped atrium

COLOR OF TOTAL SPECIMEN: COMBINATIONS POSSIBLE (CS)

KBK (66) black
KOR (67) orange
KRD (68) red
KMG (69) magenta/green
KRB (70) red brown
KGB (71) golden brown

ANTERIOR ATRIAL EDGE			(CS)
ATR	(17)	a ridge (Schick 1969)	
ATM	(18)	a rounded edge	
ATS	(19)	a shute, rounded and overhanging atrial wall	
ANTERIOR ATRIAL GUIDE			(CS)
ACT	(21)	circular orifices, no restrictive edge	
AST	(22)	orifices in corner, perpendicular lateral wall	
ARN	(23)	rounded wall leading to centrally located orifices	
AFL	(24)	flat atrium-at least for posterior 2/3	
HABITAT			(CS)
HTR	(26)	tree	
HGB	(27)	buildings, mostly brick	
HRK	(28)	rock structures	
HFN	(29)	fence	
HWD	(30)	wooden man made structures	
ANTERIOR SPERMATHECAL DUCTS			(CS)
SDC	(32)	convergent	
SDP	(33)	parallel structures	
SEMINAL RECEPTACULA			(CS)
SPP	(36)	parallel structures	
SPC	(37)	convergent structures	
SPD	(37)	divergent structures	
DIVERTICULA OF THE SPERMATHECAE			(CS)
DBL	(39)	ball shaped	
DBE	(40)	beetlike	
DCO	(41)	convergent	
DPL	(42)	parallel	
DTC	(43)	structures physically touching	
SHAPE OF THE SPERMATHECAE			(CS)
SPV	(45)	vaselike	
SPK	(46)	convergent	
SPE	(47)	receptaculum and duct equal in diameter	
SPT	(48)	touching posteriorly near the posterior median notch	
SPL	(49)	spermathecae larger than the ducts	
SPA	(50)	spermathecae angled to ducts, mallotlike	
MEDIUM SEPTUM			(CS)
MSD	(52)	slits of intromittent orifices divergent posteriorly	
MSA	(53)	orifices widely separated, slits convergent	
MSP	(54)	slits parallel	

LSL	(35)	tibia III, ventral
LSA	(36)	tibia III, prolateral-subapical
LSN	(37)	tibia III, ventral, retrolateral-subapical
LSO	(38)	tibia III, ventral, prolateral
LSP	(39)	tibia IV, prolateral, medial
SAA	(40)	tibia IV, retrolateral, apical third
SBB	(41)	tibia IV, ventral, antiapical 1/10
SCC	(42)	tibia IIV, ventral, prolateral-subapical
SDD	(43)	tibia IV, ventral, retrolateral-subapical
SEE	(44)	tibia IV, ventral, proximal third
SFF	(45)	tibia II
SGG	(46)	tibia III
SJJ	(47)	tibia IV

SCALES BEHIND THE ANTERIOR ROW OF EYES (CS)

PKK	(49)	medial spot only
PLL	(50)	lateral spots only
PCQ	(51)	white band completely behind anterior row,
PCT	(52)	three spots, two lateral and one medial
PCC	(53)	off white scales, not of pure whiteness
PCD	(54)	clear scales only

SCALES BEHIND THE POSTERIOR LATERAL EYES (CS)

PLU	(56)	white triangular patches
PLV	(57)	white band or X pattern across cephalic groove
PLE	(58)	clear scales only

SCALES BEHIND THE POSTERIOR MEDIAN EYES (CS)

PEW	(60)	presence of white scales
PEG	(61)	clear scales only

SHAPE OF TIBIAL APOPHYSES (CS)

TAB	(63)	truncated
TAT	(64)	twisted
TAG	(65)	bifid

NUMBER OF SPINES BETWEEN THE CYMBIUM AND TIBIAL APOPHYSIS (CS)

SP2	(67)	two
SPI	(68)	one
SPO	(69)	zero

LEG MEASUREMENTS - LENGTH (CS)

LG1	(71-74)	leg one
LG2	(76-79)	leg two

CARD 3

LG3	(7-10)	leg three
LG4	(12-15)	leg four

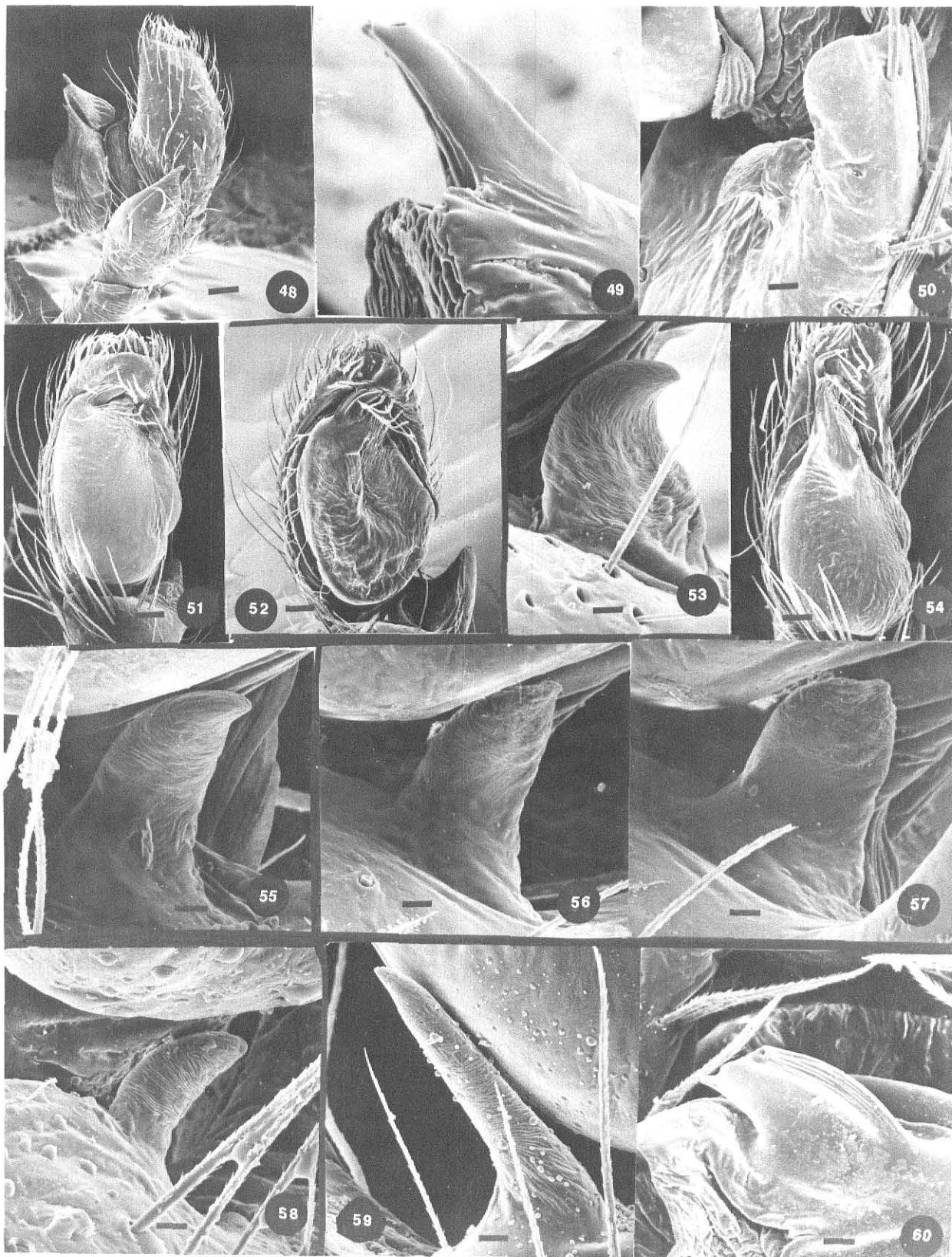
MARKINGS ON THE ABDOMEN			(CS)
MLS	(73)	lateral stripes	
MCL	(74)	clear scales produce magenta/green color	
MTR	(75)	transverse oblique bands	
MBD	(76)	complete transverse bands	
LEG COLORATION AND MARKINGS			(CS)
LGD	(78)	dark bands or stripes marking legs, not solid color	
LGA	(79)	amber or light colored, no marks, uniform color	
CARD 2			
SID		occupies the first four columns as described for card 1	
ATW	(7-10)	atrium width which measures the gap produced by the sunken atrium	
INTROMITTENT ORIFICES - LOCATION OF			(CS)
ORX	(12)	opening within an anterior atrial wall partially formed by their slits, producing a median septum	
ORY	(13)	opening into lateral walls or corners of an anterior atrial and lateral walls	
ORZ	(14)	openings within a declivity of anterior atrium	
ATRIUM TYPE			(CS)
ATD	(16)	deep groove, 1/2 to as deep as AAW	
ATF	(17)	flat, leading to a pit or a declivity	
ANTERIOR ATRIUM			(CS)
AAP	(19)	pit(s)	
AAQ	(20)	wall	
ANGLE OF ANTERIOR ATRIAL WALL			(CS)
FW1	(22)	represents angles of 80°-90°	
FW2	(23)	angles from 75-80°	
FW3	(24)	angles from 45-60°	
ANTERIOR LATERAL WALL FORMED BY THE SINKING ATRIUM			(CS)
LW1	(26)	angles 81-90°	
LW2	(27)	angles 75-80°	
LW3	(28)	angles 60-75°	
LW4	(29)	angles 0-45°	
LEG SPINATION			(CS)
LSH	(31)	metatarsus I. prolateral, subapical medial	
LSI	(32)	metatarsus II, prolateral, subapical medial	
LSJ	(33)	tibia III, prolateral, 2/5-3/5 from proximal tip	
LSK	(34)	tibia III, retrolateral, apical 1/3	

ORIFICE TYPE			(CS)
OCR	(56)	circular opening without slits	
OUS	(57)	slits merging basally and forming a U	
OSL	(58)	slits not merging basally	
OST	(59)		
EMBOLUS LENGTH			(CS)
EMS	(61)	embolus short	
EML	(62)	embolus long	
EMBOLUS SHAPE			(CS)
EBI	(64)	bifid	
EBE	(65)	beaklike	
DIRECTION OF EMBOLUS			(CS)
CIR	(67)	erect	
CLB	(68)	laterally bent (ectolateral)	
AME	(70-73)	diameter of anterior median eyes	(CS)
ALE	(75-78)	diameter of anterior lateral eyes	(CS)
CARD 4			
APICAL TIBIAL SPINE			(CS)
AAP	(7)	hooked	
AQQ	(8)	beak like	
ARR	(9)	minute, translucent	
ASS	(10)	elongate, acute	
AXX	(11)	fingerlike	
AYY	(12)	medium, acute	
AZZ	(13)	acute, on dorsal edge	

APPENDIX D

Micrographs 48-60

- 48. palp and tibia, expanded, ectolateral view - scenicus
- 49. embolus - scenicus
- 50. apophysis, ectolateral view - rothi
- 51. apophysis, ectolateral view - rothi
- 52. palp and tibia, ventral view - curvispinus
- 53. apical tibial spine, medial view - curvispinus
- 54. palp and tibia, ventral view - austinensis
- 55. apical tibial spine, medial view - peckhamae
- 56. apical tibial spine, medial view - alveraeae
- 57. apical tibial spine, ectolateral view - alveraeae
- 58. apical tibial spine, medial view - regalus
- 59. apical tibial spine, medial view - rubiginus
- 60. embolus - imitatus



APPENDIX E

Bibliography

- Ashlock, P. 1969. A non-computer Introduction to Phenetic Methodology in Systematics. Contribution No. 1479 from the Department of Entomology, The University of Kansas.
- Banks, N. 1895. Some new Attidae. Can. Entomol. 27:96-102.
- Bell, M. 1979. Persistence of Ancestral-sister species. Syst. Zool. 28(1):85-88.
- Bonnet, P. 1945-1961. Bibliographia Araneorum. Toulouse. Vol. 1:1-832, Vol. 2:
- Chamberlin, R. V. & W. Ivie. 1933. Spiders of the Raft River Mountains of Utah. Bull. Univ. Utah 23, Biol. Ser. 2:23.
- Emerton, J. H. 1902. The common spiders of the United States. Boston 1-235.
- Entomologists Newsletter. 1971. Div. of Ent. Indian Agric. Res. Int., New Delhi, Vol. 1(8).
- Kaston, B. J. 1972. How to Know the Spiders. 2nd ed. Dubuque, IA. W. C. Brown. 1-289. (Also 3rd ed. 1978:1-272).
- Lucas, H. 1833. Memoirs sur plusieurs Arachnides Nouvelles appartenant au genre Atté de M. de Walckenaer. Ann. Soc. Ent. Fra, 2. 476-482.
- Mayr, E. 1969. Principles of Systematic Zoology. McGraw-Hill, Inc.
- Peckham & Peckham. 1885. On the genera of the family Attidae. Proc. Natur. Hist. Soc. Wis. 1:257-352.
- Peckham & Peckham. 1888. Attidae of North America. Trans. Wis. Acad. Sci. 7:1-104.
- Peckham & Peckham. 1892. Ant-like spiders of the family Attidae. Occ. Pap. Natur. Hist. Soc. Wis. 2:1-83.
- Peckham & Peckham. 1894. Spiders of the Marptusa group of the family Attidae. Occ. Pap. Natur. Hist. Soc. Wis. 2:85-141.
- Peckham & Peckham. 1895. Spiders of the Hamalattus group of the family Attidae. Occ. Pap. Natur. Hist. Soc. Wisc. 2: 159-183.

- Petrunkévitch, A. 1911. A synonymic index-catalogue of spiders of North, Central and South America, etc. Bull. Amer. Mus. 29:1-809.
- Petrunkévitch, A. 1952. Principles of Classification as illustrated by Studies of Arachnida. Sys. Zool. 1:1-19.
- Platnick, N. I. 1975. A Revision of the Palpimanid spiders of the new subfamily Itiothopinae (Araneae, Palpimanidae), Amer. Mus. Novitates, N.Y.
- Savory, T. 1959. Instinctive living. Pergamon Press, N.Y.
- Savory, T. 1964. Arachnida. Academic Press, London & N.Y.
- Savory, T. 1974. Introduction to Arachnology. Wheaton & Co., Exeter.
- Snedecor & Cochran. 1967. Statistical Methods, Iowa State University Press.
- Sokal and Sneath. 1973. Numerical Taxonomy, W. H. Freeman and Company, San Francisco.
- Stephens, H. A. 1969. Trees, shrubs, and woody vines in Kansas. Univ. Press of Kansas.
- Vogel, B. R. 1967. A list of new North American spiders (1940-1966). Mem. Amer. Entomol. Soc. 23:1-186.

VITA

Raymond A. Sweet, son of Raymond E. Sweet and Mildred I. Sweet, was born October 3, 1944, in Huntington, Indiana. He attended the public schools of Huntington, graduating from Huntington High School in 1963. He earned a B.S. degree with a major in Biology/Secondary Education and a minor in Chemistry/Physical Education from Manchester College in 1967. He earned an M.S. in Middle School Science Education from the University of South Florida in 1975. He entered Kansas State University to study toward a Masters Degree in the Department of Entomology in 1979. He was a Teaching Assistant in the Fall of 1979 to the Spring Semester of 1981. He was awarded a Graduate Research Assistantship for the Summer of 1980 and again for the Spring Semester of 1981.

He is a member of the American Arachnological Society.

He was united in marriage to Alvera Reichert in Antonino, Kansas on June 15, 1973.

REVISION OF THE GENUS SALTICUS (ARANEAE: SALTICIDAE),
NORTH AMERICA, NORTH OF MEXICO

by

RAYMOND ALLEN SWEET

B.S., Manchester College, 1967
M.S., University of South Florida, 1973

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the
requirements for the degree

MASTER OF SCIENCE

Department of Entomology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1981

Abstract of Thesis.

The four previously known species of Salticus plus eight new species that occur in America North of Mexico are described and illustrated. Anatomical structures are illustrated, new characters are introduced, and results of a phenetic analysis are presented and compared to a cladistic evaluation. Keys to males and females are included. The male of Salticus austinensis is illustrated for the first time. The confusion over the original description of palpalis (Banks, 1904) and palpalis, sensu Peckham and Peckham (1909) is addressed.

Phenograms of a SAS clustering program designed by James H. Goodnight (1979 ed.) were constructed. The phenetic analysis contained 43 character states and 132 unit characters (Sneath and Sokal, 1973) which are listed in Table 2 of Appendix C.

Micrographs of the atrium of the epigynum are included to supplement the illustrations and demonstrate depth, which is considered to be a diagnostic character.

The range of austinensis has been extended from Texas into Kansas; scenicus is reported from Kansas for the first time, its range which has previously been reported as cosmopolitan, is restricted to an area north of 36° latitude in North America. It is, however, also reported from Europe, Northern Africa and Argentina of South America.