

THE RED STENODYNERUS OF FLORIDA
(Hymenoptera, Vespidae)

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The genus *Stenodynerus* Saussure is represented in Florida by 17 known species and subspecies including 5 described in this paper. They are not closely related within the genus but 14 of them have in common a characteristic type of dull red markings associated with a distribution limited to southeastern United States or to Florida alone. Most of these red-marked forms are merely subspecies of more widely distributed yellow-marked forms occurring to the north and west. The only exceptions appear to be *histrion*, *australis*, *beameri* and possibly *bifurcus*. The last named seems very close structurally to *S. pedestris* (Saussure) and may be a subspecies of it.

The red-marked *Stenodynerus* of Florida are abundant and constitute an outstanding part of the endemic fauna. Indeed, it is almost always possible to recognize a Florida specimen by its markings without determining the species. Two other areas in which the solitary vespids can be used as indicators are Lower California, where reduced punctuation is the rule, and the Hawaiian Islands where black is the predominant color. In addition to *Stenodynerus* many other Floridan vespids,¹ sphecoids, bees, and even some flies exhibit the same shade of red.

The collections examined which contained appreciable numbers of Florida material were in the U. S. National Museum, Museum of Comparative Zoology at Harvard, Academy of Natural Sciences at Philadelphia, American Museum of Natural History, California Academy of Sciences, Cornell University, and University of Kansas. In addition, my brother, G. E. Bohart, and I collected several hundred specimens in the vicinities of Cocoa and Orlando.

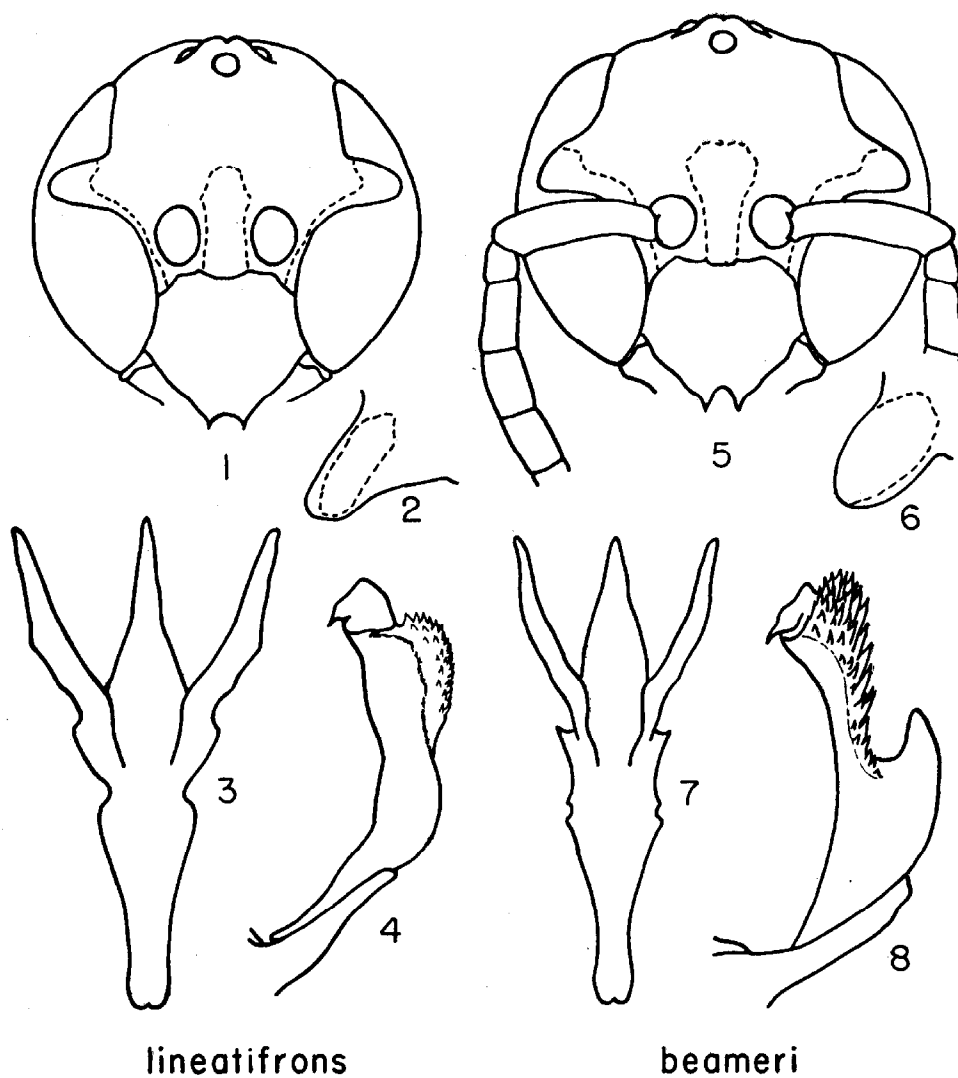
KEY TO THE RED-MARKED STENODYNERUS OF FLORIDA

1. Parategulae slender, somewhat to strongly incurved along oblique inner margin,² and usually hooked or pointed toward apex..... 2

¹ Examples are *Eumenes smithii* Saussure, *Leptochilus tylocephalus* (R. Bohart), *Rygchium foraminatum apopkense* (Robertson), *Pachodynerus erynnis* (Lepeletier), and *Zethus sloossonae* Fox.

² The parategula is the mesonotal projection directly behind the tegula; it is usually colored but its edge is membranous and the margin is outside the colored portion.

- Parategulae broadened, outcurved or at least straight along oblique inner margin, usually broadly rounded at apex 7
2. Intercellar area with tubercles, which may be weakly developed; interantennal spot linear, not much broadened above 3
- Interocellar area flat or concave, without tubercles; interantennal spot sometimes broadened above 5



EXPLANATION OF FIGURES

Figs. 1-4, *Stenodynerus lineatifrons* Bohart, holotype male, front view of head, parategula, flattened aedeagus, and extension of paramere, respectively.

Figs. 5-8, *Stenodynerus beameri* Bohart, holotype male, front view of head, parategula, flattened aedeagus, and extension of paramere, respectively.

3. Summit of tergite I without a transverse ridge; tergite III apically banded and tergite II spotted, at least in male; interocellar tubercles weak, propodeum not forming a horizontal shelf behind postscutellum; male with mid femur toothed, hind femur somewhat swollen, and antennal hook stout *fundatiformis* (Robertson)
 Summit of tergite I with a transverse ridge; tergite III and those following dark, tergite II unspotted; propodeum forming a distinct horizontal shelf below postscutellum, legs of male not modified as above, antennal hook slender 4
4. Acarinarium present beneath lengthened apex of tergite II; sculpture very coarse, punctures of mesonotum nearly as large as ocelli; longitudinal ridges at base of sternite II separated by about 2 ocellus diameters near middle of body; male mid femur not depressed beneath at base; tergite II frequently all dark....*histrion* (Lepeletier)
 Acarinarium absent; sculpture less coarse, punctures of mesonotum much smaller than ocelli; generally not more than one-half as large; longitudinal ridges at base of sternite II separated by little more than 1 ocellus diameter near middle of body; male mid femur depressed beneath at base; tergite II apically banded (figures 1-4) *lineatifrons* R. Bohart
5. Sternite II bent outward near base as seen in profile, without a median crease; acarinarium present; male antennal hook black; tergite II unspotted *perennis anacardivora* (Rohwer)
 Sternite II evenly convex in profile, with a median basal crease; acarinarium absent; male antennal hook brown or red 6
6. Tergite I with a distinct, irregular, transverse ridge across its summit; clypeus spade-like, truncate apically; male with mid femur somewhat distorted; ocelli normal, sternite II trituberculate
 *clypeolatus floridanus* Robertson
 Tergite I somewhat roughened at summit but not ridged; clypeus not spade-like; male with ocelli larger than usual, sternite II and mid femur normal *australis* (Robertson)
7. Without an acarinarium beneath apex of tergite I, juncture of I and II marked at least laterally by a transverse row of pit-like depressions; no smooth, raised area on either side of tergite I behind summit; interocellar area with tubercles; flagellum of male usually pale beneath almost to apex 8
 With an acarinarium beneath lengthened apex of tergite I, juncture of I and II smooth 11
8. Sternite II with coarse punctures toward basal middle; male clypeus coarsely punctured and sharply incised at apex, female unknown (figures 5-8) *beameri* R. Bohart
 Sternite II rather finely punctured toward basal middle; male clypeus moderately incised at apex 9
9. Tergite I without a row of large punctures across summit; sternite II with preapical pale spots which may be very large, apical band complete; segments III and following, or some of them, yellow-marked *oculeus* (Robertson)

- Tergite I with a row of large punctures across summit; sternite II without preapical pale spots; segments II and following dark.... 10
10. Interantennal spot narrowly wedge-shaped, often linear; male clypeus rather coarsely punctured, apex broader than median ocellus (figures 1-4) *lineatifrons* R. Bohart
- Interantennal spot broadly wedge-shaped, not linear; *clypeus* unusually long and apically narrowed in both sexes, that of male rather finely punctured, apex about as broad as median ocellus *ammonia* (Saussure)
11. Tergite I not as broad as length of II beyond acarinarium; ridge across summit of tergite I low but fairly distinct, without a smooth raised area on either side behind summit; interocellar tubercles low and narrow; mid femur of male with a definite basoventral depression *bifurcus* (Robertson)
- Tergite I about as broad as length of II beyond acarinarium; tergite I usually with a smooth, pale-marked raised area on either side behind summit; mid femur of male not depressed basoventrally.... 12
12. Tergite I with numerous silky hairs of 1 to 3 ocellus diameters in length located at summit and extending back at least to middle of horizontal surface 13
- Tergite I without long hairs or with a few moderate ones near summit only 14
13. Interocellar tubercles present, rather low in female but bulging in male; longer hairs of tergite I becoming sparse towards apex of segment; male ocelli small, front ocellus about one-half as broad as interantennal area and separated by about twice its diameter from lateral ocelli *bicornis* (Robertson)
- Interocellar area somewhat raised and shiny but not tuberculate; longer hairs of tergite I thick toward apex of segment; male ocelli large, front ocellus as broad as interantennal area and separated by about its diameter from lateral ocelli *saecularis rufulus* R. Bohart
14. Tergite I with a strong ridge across summit; tergite II without an entrance depression to acarinarium, unspotted; male clypeus sparsely punctured, weakly incised apically; flagellum broadly red on basal half in both sexes *fulvipes rufovestis* R. Bohart
- Tergite I without a ridge or large punctures across summit; tergite II with an entrance depression to acarinarium (visible only when II is bent at an angle with I); male clypeus coarsely punctured and very deeply incised apically;³ flagellum mostly black..... *vagus slossonae* R. Bohart

Stenodynerus (Stenodynerus) fundatiformis (Robertson)

Odynerus fundatiformis Robertson, 1901. Trans. Amer. Ent. Soc. 27: 197. Male, Inverness, Florida.

³ Male character taken from specimens of typical *vagus*.

SPECIMENS STUDIED.—*Florida*: Titusville, DeFuniak Springs, Sanford, Suwannee Springs, Cocoa, Fort Mead, Hilliard, Fruitville, Branford, Lacoochee, Lamont, Naples, Blountstown, Mulberry, Fort Worth; *Alabama*: Mobile; *Missouri*: Brandon; *Arkansas*: Fort Smith; *Texas*: Frio County; *Mississippi*: Orange Grove; *Georgia*: Valdosta, Wadley, Okefenokee Swamp, Prattsburg; *South Carolina*: St. Mathews.

Stenodynerus (Stenodynerus) oculus (Robertson)

Odynerus oculus Robertson, 1901. Trans. Amer. Ent. Soc. 27: 197. Male, female, Orlando, Florida.

SPECIMENS STUDIED.—*Florida*: Inverness, Hilliard, Dade City, St. Petersburg; *Georgia*: Okefenokee Swamp.

Stenodynerus (Stenodynerus) australis (Robertson)

Odynerus australis Robertson, 1901. Trans. Amer. Ent. Soc. 27: 197. Male, female, Inverness, Florida.

SPECIMENS STUDIED.—*Florida*: Inverness, Lacoochee, Orlando, Palm Beach, Sanford.

Stenodynerus (Stenodynerus) beameri, new species

MALE.—Black, deep yellow and reddish. Deep yellow or orange-yellow are: mandible mostly, clypeus, scape in front, inner surface of flagellum, lower orbit, interantennal line broadened above, postocular spot, 2 barely joined humeral spots, tegula, spot beneath, parategula, postscutellum mostly, propodeal angles largely, legs partly, abdominal tergite I except for basal slope and small triangular spot along summit (absent in one paratype, small in another), apical margins of tergite II broadly, tergite IV very weakly and sternite II. Brownish red are: Legs partly, basal slope of tergite I partly, free lateral spot on tergite II (absent in paratypes), large spots at base of sternite II. Wings deeply brown stained and somewhat violaceous. Pubescence short and inconspicuous. Punctuation moderate to coarse. Punctures of clypeus deep and rather close, those of front and mesonotum coarse and close, those of propodeum above pit-like, those of horizontal surface of tergite I coarse and close, becoming larger toward summit where they form a poorly defined ridge, those toward apex of tergite II very coarse and somewhat elongate in a cribose band. Front of head and parategula as in figs. 5 and 6; last antennal segment somewhat flattened, curved, reaching base of tenth; interocellar area with narrow tubercles not bridged over front ocellus; indistinct ocular swellings present; propodeum forming a narrow but distinct shelf behind postscutellum; pits across base of tergite II becoming obsolete medially; tergite II with an oblique apical reflex of 1.5 ocellus diameters (1 to 2 in paratypes); sternite II rather evenly convex and with a basomedian crease; genitalia as in figs. 7 and 8, aedeagus with sharp median expansion and notched

submedian expansion, extension of paramere peculiar in form. Length to apex of second tergite 7.0 mm.

HOLOTYPE, male, Hilliard, Florida, August 19, 1930 (R. H. Beamer). PARATYPE, 2 males, Gainesville, Florida, October 2, 1914. Type in collection of University of Kansas.

Externally, *beameri* resembles closely the more yellow northern specimens of *S. (Parancistrocerus) bifurcus* (Robt.). The acarinarium under the slightly lengthened tergite I of the latter and the fact that the first flagellar segment is distinctly longer than the next 2, instead of nearly equal as in *beameri* can be used for separation characters. However, the male genitalia of *beameri* are unique.

Stenodynerus (Stenodynerus) lineatifrons, new species

MALE.—Black, deep red and dull yellow. Red are: mandible at tip, basal 3 antennal segments, flagellum beneath as far as tenth segment, lower orbit, postocular spot, 2 nearly confluent humeral spots, tegula, spot beneath, parategula, postscutellum, horizontal surface of tergite I and sternite I. Clypeus yellow. Dull reddish yellow are: linear interantennal mark, legs except for coxae partly, narrow apical bands of tergites I and II, and sternite II. Wings brownish, slightly violaceous. Pubescence short, fulvous on vertex and notum, silvery on clypeus, pleuron and abdomen. Punctuation moderate on clypeus, coarse and fairly close on front, mesonotum, and tergite I except for dark basal part; an undulating row of large shallow punctures across summit of tergite I outlining an indistinct ridge, propodeum with pit-like punctures above. Punctures of tergite II coarse but well spaced, becoming a little larger and closer just before apex. Front of head and parategula as in figs. 1 and 2, in some male paratypes parategula has a broader membranous inner (posterior) margin; last antennal segment rather cylindrical, curved, reaching apex of tenth; interocellar area with 2 smooth tubercles which are not bridged over front ocellus; humeral angles weak, propodeum forming a distinct rough shelf below postscutellum. Mid femur with a basal depression beneath; tergite I more than half as long as broad in dorsal view; tergite II with apical reflex less than 1 ocellus diameter; sternite II with a median basal crease. Extension of paramere with a large many-toothed basal crest (fig. 4), aedeagus as in fig. 3. Length to apex of second tergite 7.5 mm.

FEMALE.—Mandible and legs mostly reddish, first 4 antennal segments red, a few others partly reddish, propodeum with a red lateral spot, a small lateral spot sometimes present on tergite II, clypeus with a curved reddish spot on basal one-third, orbital dots present. Vertex pit about as large as on ocellus. Length to apex of second tergite 9.0 mm.

HOLOTYPE, male, Jacksonville, Florida (W. H. Ashmead). PARATYPES, 4 males and 11 females from the following Florida localities: Jacksonville (W. H. Ashmead), Orange Co. (W. A. Hier), Palm Beach, Cocoa (G. Bohart). One female paratype, Carolina Beach, North Carolina (F. S. Blanton); 1 female paratype, McClellanville, South Carolina (H. K. Townes). Paratypes were collected from May through July. Type in U. S. National Museum.

This species resembles *ammonia* (Saussure) and *australis* (Robertson) but differs from both of these in that the basal part of tergite I is dark. Also, the parategulae are narrower than in *ammonia* and the frontal mark in *lineatifrons* is narrow instead of widened above as in the other 2 species.

Stenodynerus (Stenodynerus) ammonia (Saussure)

Odynerus ammonia Saussure, 1853. Etudes sur la Familles des Vespides 1: 144. Female, "Carolina".

SPECIMENS STUDIED.—*Florida*: Cocoa, Royal Palm, Cudjoe Key, Charles Harbor, Lacoochee, Cedar Keys, Hilliard, Orlando, Capron, Jacksonville, Vilano Beach, Lower Matecumbe Key, Naples, Gainesville.

*Stenodynerus (Stenodynerus) clypeolatus
floridanus* (Robertson)

Odynerus floridanus Robertson, 1901. Trans. Amer. Ent. Soc. 27: 197. Female, Inverness, Florida.

SPECIMENS STUDIED.—*Florida*: Charles Harbor, Palm Beach, Gladeland, Vero Beach, Cocoa, Miami, Brighton, Lower Matecumbe Key, Inverness.

Stenodynerus (Parancistrocerus) vagus slossonae,
new subspecies

FEMALE.—Marked as in typical *vagus* Saussure but with yellow markings replaced by orange or dull red. Reddish are: mandible, antenna toward base beneath, clypeus across base, interantennal and orbital spots, postorbital spot, pronotal spot, tegula, spot beneath, parategula, post-scutellum, sides of propodeum, legs mostly, apical margin of tergites I and II, that of I attached to large oblique spot on summit, free lateral spot on tergite II, lateral apical spot on sternite II. Wings brownish. Structure as in typical *vagus* with robust form, stout parategula, short tergite II with a median entrance to acarinarium, and narrowly excavated clypeal apex. Length to apex of second tergite 10 mm.

HOLOTYPE, female, Atlantic Beach, Florida (A. T. Slosson). PARATYPE, female, Florida. Type in U. S. National Museum.

Although the male is unknown, it should be easily recognized by the deep apical incision and spine-like apical teeth of the clypeus which are characteristic of the species. Also, it should have the acarinarium entrance found only in *vagus* in North American *Parancistrocerus*.

Stenodynerus (Parancistrocerus) bicornis (Robertson)

Odynerus bicornis Robertson, 1901. Trans. Amer. Ent. Soc. 27: 196. Male, female, Inverness, Florida.

SPECIMENS STUDIED.—*Florida*: Inverness, Orlando.

Stenodynerus (Parancistrocerus) bifurcus Robertson

Odynerus bifurcus Robertson, 1901. Trans. Amer. Ent. Soc. 27: 196. Male, female, Inverness, Florida.

SPECIMENS STUDIED.—*Florida*: Inverness, Gainesville, Orlando, Tallahassee, Crescent City, Sanford, St. Johns River, Cocoa, Plant City, Moore Haven; *Georgia*: Okefenokee Swamp.

Stenodynerus (Parancistrocerus) perennis anacardivora
(Rohwer)

Odynerus anacardivora Rohwer, 1915. Proc. U. S. Nat. Mus. 49: 241. Female, Miami, Florida.

SPECIMENS STUDIED.—*Florida*: Fort Myers, Long Key, Gainesville, Maimi, Indian River, Englewood, Mayport, Jacksonville, Palm Beach, Enterprise, Orlando, Tallahassee, Flamingo, Cocoa, Upper Matecumbe Key, Goulde, St. Petersburg; *Georgia*: Atlanta; *North Carolina*: Raleigh; *Louisiana*: New Orleans.

Stenodynerus (Parancistrocerus) histrio (Lepeletier)

Odynerus histrio Lepeletier, 1841. Hist. Nat. Ins. Hym. 2: 638. Male, "Carolina".

SPECIMENS STUDIED.—*Florida*: Indian River, Haulover, Aucilla River, Royal Palm Park; *Georgia*: Brunswick; *Louisiana*; *Virginia*: Camp Peary; *District of Columbia*.

Stenodynerus (Parancistrocerus) fulvipes rufovestis
new subspecies

MALE.—Black, dull red and yellow. Clypeus yellow; Y-shaped inter-antennal mark, mandible spot and lower orbit orange-yellow; apical bands on tergites I and II and sternite II, spot on tegula, parategula, legs partly, scape in front dull orange yellow. Dull red are: basal 4 flagellar segments entirely, next 3 beneath, mandible tip, postocular spot, emarginate humeral band, narrow hind pronotal margin, tegula mostly, spot beneath, band across postscutellum, large lateral spot on tergite I attached to apical band, legs mostly. Deep red are: propodeum, sternite I, tergite I before summit ridge. Wings dusky with violet reflections. Length to apex of second tergite 8 mm.

FEMALE.—Clypeus with a basal curved reddish mark, interantennal spot abbreviated, ocular dot and red mesonotal spot present. Length to apex of second tergite 9.0 mm.

HOLOTYPE, male, Orlando, Florida, March, 1944 (R. and G. Bohart). PARATYPES, 47 males and 13 females from the following Florida localities: Orlando, Cocoa, Palatka, Upper and Lower Matecumbe Key, Key Largo, Everglades, St. Petersburg, Indian River, Key West, Cedar Key, Fruitville, Apalachicola, La Belle, Punta Rassa, and Arcadia. I have also seen a female specimen from McClellanville, South Carolina. Paratypes were collected from March to August. Type in U. S. National Museum.

Structurally *rufovestis* appears identical to *fulvipes* (Saussure). It has interocellar tubercles, relatively narrow male clypeus, broad but tapering parategulae, propodeum in a shelf below postscutellum, prominent ridge across summit of tergite I and no free spots on tergite II. It appears to be restricted mainly to central and south Florida but intermediate specimens are found occasionally as far north as Washington, D. C.

Stenodynerus (Parancistrocerus) saecularis rufulus
new subspecies

MALE.—Black, marked with orange yellow and reddish. Orange yellow are: mandible mostly, clypeus, lower orbit, wedge-shaped interantennal spot, scape in front, legs partly, apical bands on tergites I and II and sternite II. Orange red are: scape behind, pedicel, flagellum beneath at base, postocular spot, 2 humeral spots, tegula partly, spot beneath, parategula, postscutellar band, propodeum partly, spot along summit, sternite I. Wings brown stained, somewhat violaceous. Pubescence pale grey to fulvous, mostly rather sparse but longer and more prominent than usual; that on dorsum of thorax, near summit of tergite I and at basal middle of sternite II as long as 1.5 ocellus diameters. Puncturation moderately coarse, well spaced on clypeus; tergite I with a row of shallow punctures following a well-defined ridge across summit. Vertex with smooth area present near compound eye, clypeus angularly incised at apex; parategula rather broad; interocellar area punctured, not raised above ocelli which are large with a diameter about as great as length of pedicel; propodeum with a weak shelf below postscutellum; tergite I nearly as broad as II in top view; tergite II apically reflexed about $\frac{1}{2}$ ocellus diameter; sternite II with a shallow basomedian crease. Length to apex of second tergite 8.0 mm.

FEMALE.—Markings often more extensively orange red instead of orange yellow. Clypeus with a curved basal mark of red or orange; ocular and mesonotal dots present, spots sometimes present between ocelli and compound eye; tergite IV sometimes banded; sternite II sometimes with apicolateral spots instead of band. Vertex depression angled behind, as broad as 2 ocellus diameters; ocelli smaller than in male, diameter of hind ocellus $\frac{2}{3}$ pedicel length. Length to apex of second tergite 9.5 mm.

HOLOTYPE, male, Orlando, Florida, May 21, 1925 (O. C. McBride). PARATYPES, 2 males and 8 females from the following Florida localities: Waldo (R. H. Beamer, J. Nottingham), Jacksonville (W. H. Ashmead), No Name Key (G. N. Collins), Dunnellon (D. E. Hardy), Davenport and Wildwood (J. Nottingham), Homestead (J. C. Bradley), Tampa and Miami. Type in U. S. National Museum.

A nearly mature male from Orlando, Florida, (D. J. Nicholson) bears the data "reared from oak galls on scrub oak."

The extensive reddish markings distinguish this subspecies from typical *saecularis* Saussure which occurs along the eastern seaboard from Georgia to New Jersey and in Texas.

INSECTICIDE STUDIES ON CHINESE CABBAGE FOR THE CONTROL OF THE TURNIP APHID, *Rhopalosiphum* *pseudobrassicae* (Davis) AND CERTAIN FOLIAGE FEEDING LARVAE

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A number of serious insect pests attack Chinese cabbage in the peat and muck soils of the Florida Everglades. Seldom is this vegetable grown without moderate to severe infestations of aphids, and several important leaf feeding larvae often attack the crop. The habit of growth of the Chinese cabbage plant is such as to make insect control difficult, especially after heading begins. The tight fitting, upright, cupped leaves offer protection to insects from applications of spray materials. If insects are present even in moderate numbers, many heads of cabbage are not marketable, and a large number must be stripped severely to remove the infested leaves. Since aphids constitute the most serious insect pest of the crop in this area, an experiment was conducted at the Everglades Experiment Station for the purpose of testing some of the new insecticides for their effectiveness against these pests, and to compare them with standard aphicides. Cutworms, predominately the black cutworm, *Agrotis ypsilon* (Rott.); the fall armyworm, *Laphygma frugiperda* (A. & S.); and the cabbage looper, *Trichoplusia ni* (Hbn.) appeared in the plots and a record of the performance of the treatments on these insects was obtained.

METHODS AND MATERIALS.—The plot area was plowed, disced, leveled and mole drained. Soil reaction determinations showed