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THE WHEEL BUG, ARILUS CRISTATUS (LINNAEUS)(HEMIPTERA: REDUVIIDAE)[1/]

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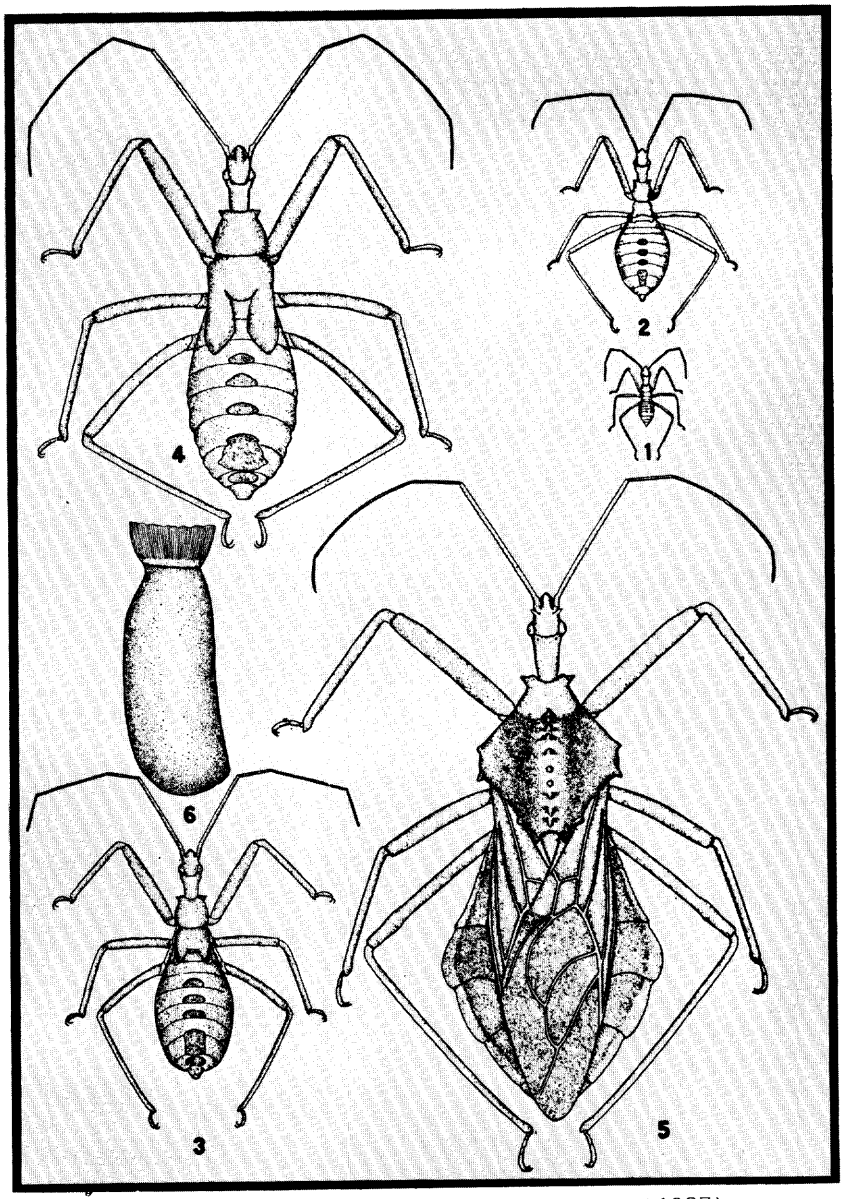

WHEEL BUG, ARILUS CRISTATUS, AFTER READIO (1927). FIG. 1-4: 1ST, 3RD, 4TH, 5TH INSTAR NYMPHS, RESP.; FIG. 5: ADULT FEMALE; FIG. 6: EGG 6X SCALE OF 1-5.

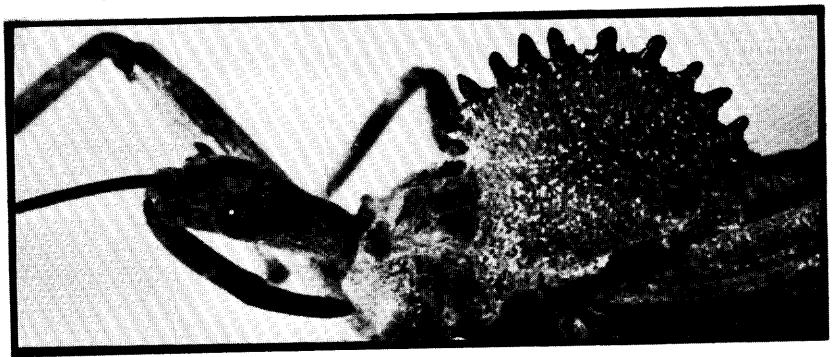

FIG. 7: ADULT ARILUS CRISTATUS (L.)(ORIGINAL) 5.5X; LATERAL VIEW, HEAD & PRONOTUM.

SYNONYMY: WYGODZINSKY (1949) LISTED THE FOLLOWING SYNONYMS: GENERA: CIMEX LINNAEUS, PRIONOTUS LA PORTE, AND PRIONIDES UHLER; SPECIES: DENTICULATUS WESTWOOD, NOVENARIUS (SAY), AND PATULUS (WALKER).

INTRODUCTION: THE WHEEL BUG, ARILUS CRISTATUS (LINNAEUS), IS A MODERATELY COMMON, WIDELY DISTRIBUTED, BENEFICIAL ASSASSIN BUG THAT PREYS ON MANY PEST INSECTS; HOWEVER, ITS BITE USUALLY IS MORE SEVERE THAN A BEE STING, AND BOTH NYMPHS AND ADULTS SHOULD BE AVOIDED OR HANDLED WITH CAUTION.

DISTRIBUTION: THE WHEEL BUG OCCURS THROUGHOUT FLORIDA. IT HAS BEEN REPORTED FROM RHODE ISLAND WESTWARD THROUGH IOWA AND NEBRASKA TO CALIFORNIA, AND SOUTHWARD TO TEXAS AND FLORIDA. BLATCHLEY (1926) INCLUDED MEXICO AND GUATEMALA IN ITS RANGE. WYGODZINSKY (1949) RECOGNIZED 4 SPECIES OF ARILUS IN THIS NEW WORLD GENUS, BUT ONLY CRISTATUS OCCURS IN THE UNITED STATES.

DESCRIPTION AND IDENTIFICATION: THE WHEEL BUG ADULT (FIG. 5 AND 7) USUALLY MEASURES FROM 1 TO 1.25 INCHES LONG. THIS ASSASSIN BUG IS A DARK ROBUST, GROTESQUE CREATURE HAVING LONG LEGS AND ANTENNAE, STOUT BEAK, LARGE EYES ON A SLIM HEAD, AND A PROMINENT THORACIC, SEMICIRCULAR CREST SUGGESTING A COGWHEEL OR CHICKEN'S COMB (FIG. 7). THIS IS THE ONLY INSECT SPECIES IN THE UNITED STATES WITH SUCH A CREST. THE NUMBER OF TEETH (TUBERCLES) IN THE CREST VARIES FROM 8 TO 12. FEMALES ARE LONGER AND WIDER THAN MALES, WITH THE ABDOMINAL MARGINS BEING MORE WIDELY EXPOSED IN THE FEMALES. A VERY FINE YELLOWISH PUBESCENCE IS PRESENT OVER MOST OF THE BODY, EXCEPT THE ELYTRAL MEMBRANE WHICH PRODUCES BRONZE-COLORED REFLECTIONS. THE OVERALL COLOR IS MOSTLY DARK BROWN. VARIABLE AMOUNTS OF TINY WHITE PATCHES OR GRANULES ARE SCATTERED THROUGHOUT THE PUBESCENCE. NYMPHS (FIG. 1-4) HAVE BEEN DESCRIBED IN DETAIL BY READIO (1927). SMALLER NYMPHS ARE BRIGHT RED WITH BLACK MARKS. THE LAST INSTAR NYMPH IS DARKER. THE "WHEEL" OR CREST IS LACKING ON NYMPHS. TO DETERMINE IF A NYMPH IS ARILUS, CONSULT FRACKER AND USINGER (1949). EGGS (FIG. 6) RESEMBLE MINIATURE BROWN BOTTLES WITH FANCY WHITE STOPPERS. THEY ARE 3.7 MM LONG AND ARE LAID ON END, SIDE BY SIDE, IN A COMPACT HEXA-

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GONAL CLUSTER OF 42 TO 182 EGGS. THE CLUSTER IS GLUED TOGETHER AND COVERED BY GUMMY CEMENT THAT MAY PROTECT THE EGGS FROM FOUL WEATHER, PARASITES, AND PREDATORS. EGG CLUSTERS MOST OFTEN ARE FOUND WITHIN 4 FT OF THE GROUND ATTACHED TO TREE TRUNKS AND LIMBS, SHRUBS, AND MISCELLANEOUS OBJECTS.

IMPORTANCE AS A PREDATOR: THE WHEEL BUG HAS BEEN REPORTED PREYING UPON A WIDE VARIETY OF INSECTS IN SEVERAL ORDERS INCLUDING LEPIDOPTERA, ESPECIALLY ARCTIIDAE AND NOCTUIDAE; COLEOPTERA, ESPECIALLY CHRYSOMELIDAE AND COCCINELLIDAE; HEMIPTERA, ESPECIALLY PENTATOMIDAE; HYMENOPTERA, ESPECIALLY SAWFLIES; AND HOMOPTERA, ESPECIALLY APHIDS UPON WHICH YOUNG NYMPHS FEED. UNFORTUNATELY, THE ABOVE GROUPS INCLUDE THE BENEFICIAL LADY BEETLES AND HONEY BEES.

WHEEL BUG SALIVA CONTAINS A TOXIC, PARALYTIC SUBSTANCE THAT IMMOBILIZES AND KILLS ITS VICTIMS USUALLY WITHIN 15 TO 30 SEC AFTER INJECTION. IMMATURES OF THE LOCUST LEAFMINER, XENOCHALEPUS DORSALIS (THUNBERG), ARE KILLED AND FED UPON WHILE STILL IMBEDDED IN LEAF TISSUE. ARILUS CRISTATUS IS AN ESPECIALLY VALUABLE PREDATOR IN FOREST AND SHADE TREES BECAUSE IT PREYS ON THE WELL-PROTECTED HAIRY CATERPILLARS THAT ARE DEFOLIATORS.

MEDICAL IMPORTANCE: WHEN DISTURBED, THE WHEEL BUG CAN INFLICT A PAINFUL BITE. THE BITE HAS BEEN DESCRIBED VARIOUSLY AS WORSE THAN STINGS FROM BEES, WASPS, OR HORNETS. BARBER (1919) AND HALL (1924) DESCRIBED IN DETAIL THE EFFECTS OF SUCH BITES. IN GENERAL, INITIAL PAIN OFTEN IS FOLLOWED BY NUMBNESS FOR SEVERAL DAYS. THE AFFLICTED AREA OFTEN BECOMES REDDENED AND HOT TO THE TOUCH, BUT LATER MAY BECOME WHITE AND HARDENED AT THE PUNCTURE AREA. OCCASIONALLY A HARD CORE MAY SLOUGH OFF, LEAVING A SMALL HOLE AT THE PUNCTURE SITE. HEALING TIME VARIES BUT USUALLY TAKES 2 WEEKS AND MAY TAKE HALF A YEAR. SMITH ET AL. (1958) REVIEWED THE LITERATURE CONCERNING WHEEL BUG BITES AND CONCLUDED THAT SERIOUS OR PROLONGED EFFECTS FROM THESE BITES USUALLY ARE DUE TO SECONDARY INFECTION OR AN INDIVIDUAL HYPERSENSITIVITY. FIRST AID AND HOME TREATMENT: READIO (1927) QUOTED TOWNEND GLOVER'S REPORT THAT REPEATED APPLICATIONS OF AMMONIA WATER WERE HELPFUL IN RELIEVING PAIN FROM THE BITE. SMITH ET AL. (1958) REPORTED THAT APPLICATION OF MAGNESIUM SULFATE SOAKS WAS RECOMMENDED.

LIFE HISTORY: THE WHEEL BUG HAS ONE GENERATION A YEAR AND OVERWINTERS IN THE EGG STAGE. IN FLORIDA SOME ADULTS LIVE INTO THE WINTER MONTHS, PARTICULARLY IN THE CENTRAL AND SOUTHERN PORTIONS OF THE STATE. OF APPROXIMATELY 60 FLORIDA WHEEL BUG RECORDS AVAILABLE TO THE AUTHOR, NYMPHS WERE RECORDED FROM 22 APRIL TO 15 JUNE, WITH MOST OCCURRING IN MAY. THE LIMITATION OF NYMPHAL RECORDS TO SPRINGTIME IS GOOD EVIDENCE FOR ONLY ONE GENERATION A YEAR. IT SEEMS LIKELY THAT NYMPHS ARE PRESENT IN MARCH, BUT HAVE NOT BEEN RECOGNIZED AND REPORTED UNTIL THEY ARE MUCH LARGER IN LATE APRIL. ACCORDING TO TODD (1937), IT TAKES ABOUT 3 MONTHS DEVELOPMENTAL TIME FROM HATCHING OF EGG TO ADULT (AT CLEMSON, SOUTH CAROLINA). THIS DEVELOPMENTAL TIME WOULD ACCOUNT FOR NEW GENERATION ADULTS NOT BEING REPORTED IN FLORIDA UNTIL LATE MAY, ASSUMING HATCHING OCCURRED APPROXIMATELY THE FIRST OF MARCH. BASED ON AVAILABLE RECORDS, JUNE AND JULY ARE THE PEAK MONTHS FOR REPORTS OF ADULTS IN FLORIDA. REPORTS DROP OFF BEGINNING IN AUGUST, WITH VERY FEW IN SEPTEMBER AND OCTOBER, THEN INCREASE AGAIN IN NOVEMBER, WITH RECORDS THROUGHOUT THE PENINSULA. THIS SUGGESTS SOME AESTIVATION DURING LATE SUMMER AND EARLY FALL. THESE LATE FALL ADULTS ARE MOSTLY GRAVID FEMALES. A WHEEL BUG CAUGHT AT GAINESVILLE DURING DECEMBER 1973 AND BROUGHT INTO THE LAB, LAID EGGS SHORTLY THEREAFTER (R. I. SAILER, PERSONAL COMMUNICATION). THE WARMER CLIMATE OF THE SOUTH RESULTS IN LINGERING OF SOME ADULTS INTO LATE FALL AND WINTER, WITH SOME LATE OVIPOSITION, AND IN EARLIER EGG HATCHING NEXT SPRING. TODD (1937) MEASURED THE DEVELOPMENTAL TIME FOR NYMPHS IN OUTDOOR CAGES AT CLEMSON, SOUTH CAROLINA. AVERAGE TIME FOR EACH OF THE 5 NYMPHAL INSTARS WAS LISTED AS FOLLOWS: I-21 DAYS, II-14 DAYS, III-15 DAYS, IV-17 DAYS, AND V-32 DAYS, TOTALING 99 DAYS. MOUL (1945) REPORTED SOME LIFE HISTORY INFORMATION OF THE WHEEL BUG AT YORK COUNTY, PENNSYLVANIA, AND PROVIDED A DETAILED LIST OF PREY. STEHR & FARRELL (1936) REPORTED THAT A CAGED, LATE-INSTAR WHEEL BUG NYMPH CONSUMED 69 ADULTS AND 22 LARGE LARVAE OF THE MEXICAN BEAN BEETLE, EPILACHNA VARIVESTIS MULSANT, IN 28 DAYS. SOME OF THE FAVORED HABITATS OF WHEEL BUGS INCLUDE COTTON, GOLDENROD, SUNFLOWER, AND OTHER FLOWERS, TRUNKS OF LOCUST TREES, CITRUS AND PECAN GROVES, AND MISCELLANEOUS FOREST, SHADE, AND FRUIT TREES.

NOTES ON BEHAVIOR: TODD (1937) REPORTED THE WHEEL BUG UNDER NATURAL CONDITIONS AS BEING VERY VICIOUS IN THE NYMPHAL AND ADULT STAGES OF DEVELOPMENT. THIS VICIOUSNESS WAS NOT SO PRONOUNCED IN INDIVIDUALS UNDER OBSERVATION IN CAGES. HE NOTED THAT SPECIMENS COLLECTED IN THE FIELD BECOME ACCUSTOMED TO BEING HANDLED IN A VERY SHORT TIME. THE WHEEL BUG HAS BEEN REPORTED AS CANNIBALISTIC, USUALLY BASED ON CAGED SPECIMENS. NYMPHS HAVE PREYED UPON NYMPHS, AND BARBER (1920) REPORTED FEMALES KILLING AND FEEDING UPON THE MALES SOON AFTER COPULATION WAS COMPLETE. THE WHEEL BUG IS DIURNAL, BUT IT HAS BEEN FOUND AT LIGHTS, APPARENTLY ATTRACTED TO THE PREY COMING TO THE LIGHTS. FROESCHNER (1944) COUNTED 76 WHEEL BUGS AT ONE TIME AT LIGHTS IN FRONT OF A STORE IN SOUTHERN MISSOURI. SOUNDS: THE WHEEL BUG AND MOST OTHER REDUVIIDS PRODUCE "CHIRPING" SOUNDS BY RUBBING THE TIP OF THE ROSTRUM BACK AND FORTH OVER TRANSVERSE RIDGES ON A LONGITUDINAL GROOVE OF THE PROSTERNUM. MOORE (1961) CONCLUDED THAT MORE EVIDENCE IS NECESSARY TO ESTABLISH THE FUNCTIONS OF THESE SOUNDS. SCENT SACS: GARMAN (1916) AND FROESCHNER (1944) NOTED THAT WHEEL BUGS, WHEN CAPTURED, EXTRUDE (WITH LITTLE PROVOCATION) A PAIR OF BRIGHT, ORANGE-RED, SCENT SACS NEAR THE APEX OF THE VENTER. THESE SACS GIVE OFF A PUNGENT SCENT. ATTRACTANT: METZGER (1928) REPORTED THAT WHEEL BUGS WERE STRONGLY ATTRACTED TO TURPENTINE OIL.

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