

THE CARPENTER BEES OF FLORIDA  
 I. XYLOCOPA  
 (HYMENOPTERA: APIDAE: XYLOCOPINAE)<sup>1</sup>  
 E. E. GRISSELL<sup>2</sup>

**INTRODUCTION:** IN AMERICA NORTH OF MEXICO THE SUBFAMILY XYLOCOPINAE IS COMPOSED OF 2 GENERA, CERATINA (SMALL CARPENTER BEES) AND XYLOCOPA (LARGE CARPENTER BEES). THESE BEES OBTAIN THEIR COMMON NAME FROM THEIR NESTING HABITS: SMALL CARPENTER BEES EXCAVATE TUNNELS IN PITHY STEMS OF VARIOUS BUSHES; LARGE CARPENTER BEES CHEW NESTING GALLERIES IN SOLID WOOD OR IN STUMPS, LOGS, OR DEAD BRANCHES OF TREES (HURD AND MOURE, 1963). THE LATTER BEES MAY BECOME ECONOMIC PESTS IF NESTING TAKES PLACE IN STRUCTURAL TIMBERS, FENCE POSTS, WOODEN WATER TANKS, OR THE LIKE. THE GENUS CERATINA HAS 21 SPECIES IN AMERICA NORTH OF MEXICO OF WHICH 2 OCCUR IN FLORIDA (DALY, 1973), AND WILL BE TREATED IN A FORTHCOMING ENTOMOLOGY CIRCULAR. XYLOCOPA HAS 7 SPECIES IN AMERICA NORTH OF MEXICO, 2 OF WHICH OCCUR IN FLORIDA.

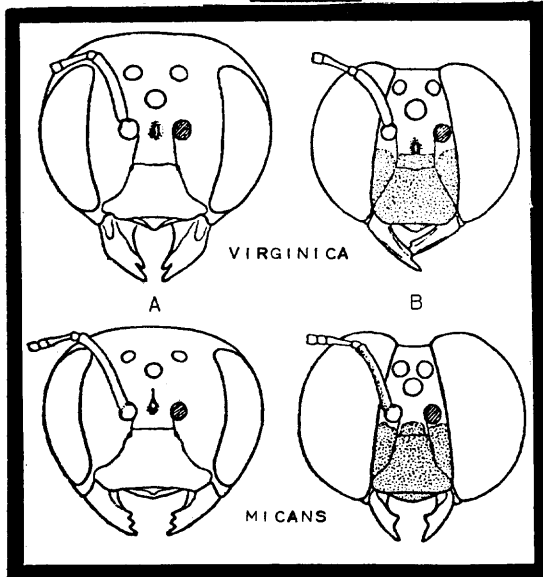


FIG. 1. XYLOCOPA, HEADS, A: FEMALE, B: MALE. (AFTER MITCHELL, 1962)

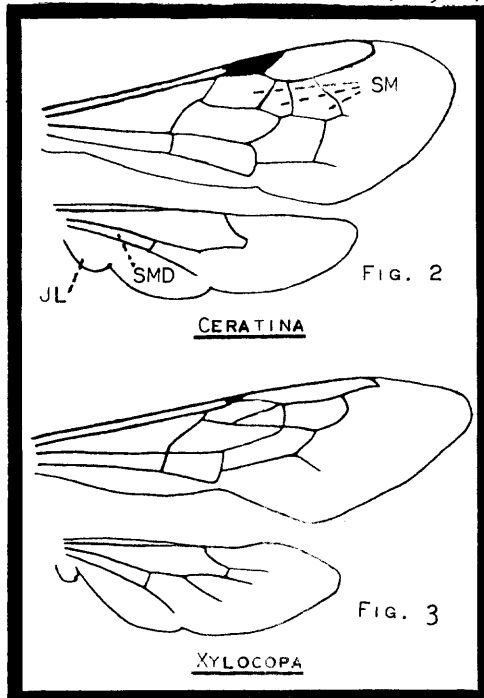


FIG. 2-3. WINGS. SMD: SUBMEDIAN CELL, JL: JUGAL LOBE, SM: SUBMARGINAL CELLS. (AFTER BORROR AND DELONG, 1971)

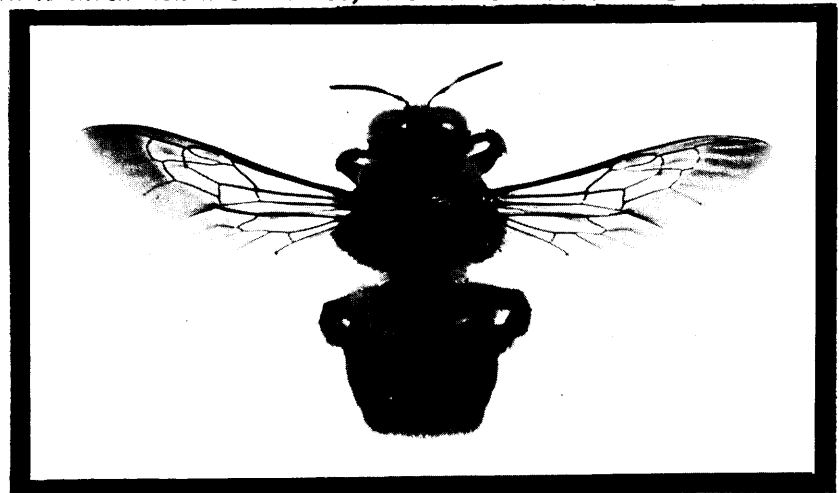


FIG. 4. XYLOCOPA VIRGINICA, ADULT, TOP VIEW

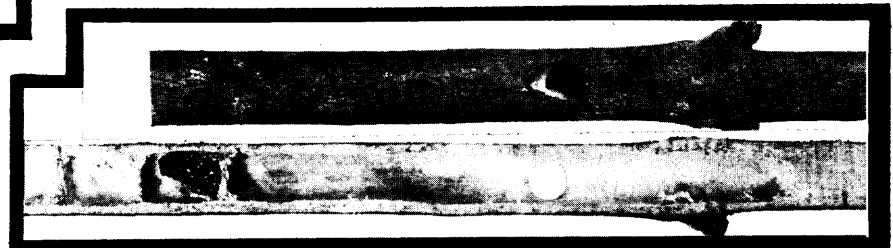


FIG. 5. XYLOCOPA MICANS NEST: ABOVE, ENTIRE TWIG; BELOW, LONGITUDINAL SECTION

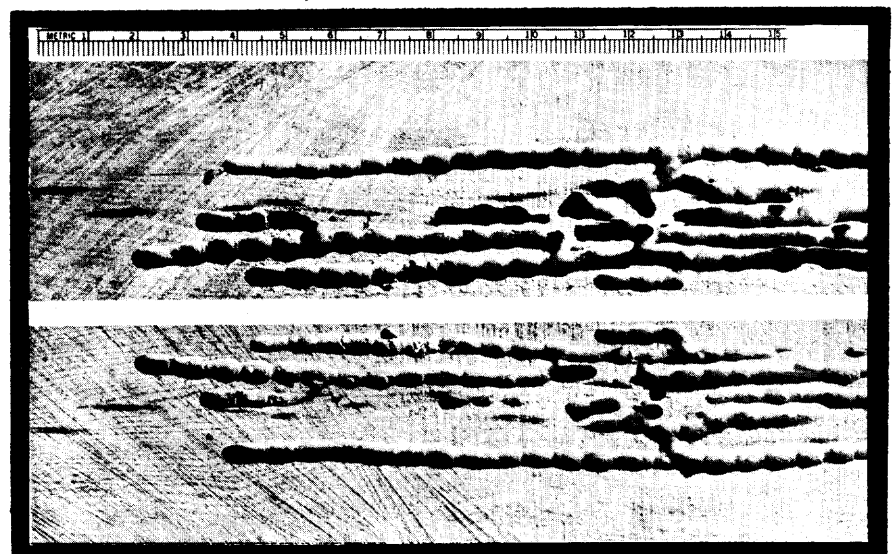


FIG. 6. XYLOCOPA SP. GALLERIES IN STRUCTURAL TIMBER (FROM HURD, 1955)

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**IDENTIFICATION:** AT VARIOUS TIMES CARPENTER BEES HAVE BEEN PLACED IN THE FAMILIES ANTHOPHORIDAE, XYLOCOPIIDAE, OR APIDAE. HURD AND MOURE (1963) TRACED THE HISTORY OF THE PLACEMENT OF THESE BEES IN VARIOUS FAMILIES; THE MOST RECENT PLACEMENT IS WITHIN THE APIDAE (KROMBEIN, 1967). THIS FAMILY IS CHARACTERIZED, IN PART, BY THE JUGAL LOBE OF THE HINDWING BEING ABSENT OR SHORTER THAN THE SUBMEDIAN CELL AND BY THE FOREWING HAVING 3 SUBMARGINAL CELLS (FIG. 2,3). WITHIN THE FAMILY, CARPENTER BEES ARE DISTINGUISHED MOST EASILY BY THE TRIANGULAR SECOND SUBMARGINAL CELL (FIG. 2,3), AND BY THE LOWER MARGIN OF THE EYE ALMOST IN CONTACT WITH THE BASE OF THE MANDIBLE (I.E., THE MALAR SPACE IS ABSENT). THE EASIEST METHOD OF SEPARATING CERATINA FROM XYLOCOPIA IS BY SIZE: CERATINA ARE LESS THAN 8 MM IN LENGTH WHEREAS XYLOCOPIA ARE 20 MM OR LARGER. XYLOCOPIA GENERALLY RESEMBLE BUMBLEBEES IN SIZE AND SOMEWHAT IN COLOR, BEING BLACK, METALLIC BLUISH OR GREENISH BLACK, OR PURPLISH BLUE. SOME MALES HAVE YELLOWISH AREAS ON THE FACE. BOTH SEXES MAY HAVE PALE OR YELLOWISH PUBESCENCE ON THE THORAX, LEGS, OR ABDOMEN, BUT THESE HAIRS ARE NOT AS ABUNDANT OR AS INTENSELY COLORED AS IN BUMBLEBEES. LARGE CARPENTER BEES ARE READILY DISTINGUISHED FROM BUMBLEBEES PRIMARILY BY THE ABSENCE OF PUBESCENCE ON THE DORSUM OF THE ABDOMEN (THE ABDOMEN IS SOMEWHAT SHINY), THE ABSENCE OF A MALAR SPACE (PRESENT IN BUMBLEBEES), AND THE TRIANGULAR SECOND SUBMARGINAL CELL. THE 2 SPECIES OF XYLOCOPIA WHICH OCCUR IN FLORIDA ARE THE ONLY SPECIES IN THE EASTERN UNITED STATES, NAMELY X. MICANS LEPELETIER AND X. VIRGINICA (LINNAEUS). THEY MAY BE SEPARATED AS FOLLOWS:

1. EYES NEARLY MEETING ABOVE (FIG. 1B); ANTENNA 13 SEGMENTED; ABDOMEN 7 SEGMENTED (MALES) ..... 2  
EYES WIDELY SEPARATED (FIG. 1A); ANTENNA 12 SEGMENTED; ABDOMEN 6 SEGMENTED (FEMALES) ..... 3
2. ABDOMEN METALLIC GREENISH BLUE; ANTENNAL SCAPE YELLOW BENEATH; LEGS WITH PATCHES OF PALE PUBESCENCE ..... MICANS  
ABDOMEN BLACK WITH SLIGHT PURPLISH TINT; ANTENNAL SCAPE COMPLETELY DARK; LEGS WITH DARK PUBESCENCE .... VIRGINICA
3. THORAX WITH DORSAL AND LATERAL BLACK PUBESCENCE; BODY METALLIC PURPLE ..... MICANS  
THORAX WITH DORSAL AND LATERAL PALE PUBESCENCE; BODY MOSTLY BLACK ..... VIRGINICA

**DISTRIBUTION:** XYLOCOPIA MICANS IS KNOWN FROM SOUTHEASTERN VIRGINIA SOUTH TO FLORIDA, WEST TO TEXAS, AND SOUTH TO GUATEMALA. THE TYPICAL FORM OF X. VIRGINICA IS KNOWN THROUGHOUT THE EASTERN UNITED STATES SOUTHWARD TO TEXAS AND NORTHERN FLORIDA; THE SUBSPECIES X. VIRGINICA KROMBEINI HURD IS RESTRICTED TO FLORIDA FROM SUMTER AND LAKE COUNTIES SOUTH TO DADE COUNTY (HURD, 1955, 1961).

**BIOLOGY:** X. MICANS.--LITTLE IS KNOWN OF THE LIFE HISTORY OF THIS SPECIES. HURD (1958) PICTURED A NEST CONSTRUCTED IN A DEAD LIGUSTRUM BRANCH. ACCORDING TO HIS REPORT IT WAS A SOUND TWIG WITH A DIAMETER OF 2.5 CM OR MORE. THE NEST ENTRANCE WAS ABOUT 1 M ABOVE THE GROUND, BUT ENTRANCES IN OTHER TWIGS WERE AS LOW AS 15 CM. I FOUND X. MICANS ACTIVELY NESTING IN A RED MAPLE BRANCH (FIG. 5) SIMILAR TO THE ONE REPORTED BY HURD (1958). THE TWIG WAS 1.6 CM IN DIAMETER NEAR THE NESTING AREA, AND PROJECTED STRAIGHT UP FROM THE GROUND. THE ENTRANCE WAS APPROXIMATELY 1.5 M FROM THE GROUND AND WAS 8 MM IN DIAMETER. THE LOWERMOST, OR FIRST, BROOD CELL WAS 12 CM BELOW THE NEST ENTRANCE. THREE CELLS HAD BEEN CONSTRUCTED WHEN THE NESTING ACTIVITY WAS INTERRUPTED ON 13 MAY 1975. X. VIRGINICA.--MUCH HAS BEEN WRITTEN ABOUT THIS SPECIES: RAU (1933) PROVIDED ONE OF THE MOST COMPLETE ACCOUNTS OF ITS BIOLOGY; HURD AND MOURE (1963) CITED MANY LITERATURE REFERENCES; BALDUF (1962) PROVIDED THE MOST UP-TO-DATE SUMMARY OF BIOLOGY AND LITERATURE; SABROSKY (1962) PROVIDED ADDITIONAL MATING BEHAVIOR. THE FOLLOWING ACCOUNT OF LIFE HISTORY IS CONDENSED FROM BALDUF (1962): MOST REPORTS INDICATE THE USE OF DRY, STRUCTURAL CONIFEROUS WOODS AS NESTING SITES. WOOD INCLUDED TAXODIUM, PINUS, AND JUNIPERUS. REPORTS WERE ALSO GIVEN FOR MAGNOLIA PLANKS AND DECIDUOUS WOODS USED IN FENCE RAILINGS. X. VIRGINICA SELECTED NESTING SITES IN WELL-LIGHTED AREAS WHERE THE WOOD WAS NOT PAINTED OR COVERED WITH BARK. IN GENERAL, THESE BEES WERE GREGARIOUS, TENDING TO NEST IN THE SAME AREAS FOR GENERATIONS. OLD NESTS WERE REFURBISHED, BUT NEW NESTS WERE ALSO STARTED. IN NEW NESTS FEMALE BEES CHEWED THEIR WAY INTO THE WOOD, EXCAVATING A BURROW ABOUT 15 MM IN DIAMETER. BORING PROCEEDED MORE SLOWLY AGAINST THE GRAIN (ABOUT 15 MM A DAY) THAN WITH THE GRAIN. THE DIRECTION OF GALLERIES IN THE WOOD APPEARED TO DEPEND ON THE DIRECTION OF THE GRAIN. IF THE GRAIN WERE ORIENTED VERTICALLY, THE NESTS WERE VERTICAL; IF HORIZONTALLY, THEN THE NESTS WERE HORIZONTAL WITH RESPECT TO THE GROUND. GALLERIES EXTENDED ABOUT 30 TO 45 CM IN NEWLY COMPLETED NESTS. NEW TUNNELS WERE SMOOTH AND UNIFORM THROUGHOUT, BUT OLDER GALLERIES SHOWED EVIDENCE OF LESS UNIFORMITY WITH RANDOM DEPRESSIONS AND IRREGULARITIES. THESE OLDER GALLERIES WERE BELIEVED TO HAVE BEEN USED BY SEVERAL GENERATIONS OF BEES. AFTER EXCAVATING THE GALLERY, FEMALE BEES GATHERED POLLEN WHICH WAS MIXED WITH REGURGITATED NECTAR. THE POLLEN MASS WAS PLACED AT THE END OF A GALLERY (OR BOTTOM IF THE NEST WERE VERTICAL), AN EGG WAS LAID, AND THE FEMALE PLACED A PARTITION OR CAP OVER THE CELL COMPOSED OF CHEWED WOOD PULP. THIS PROCESS WAS REPEATED UNTIL A LINEAR COMPLEMENT OF 6 TO 8 END-TO-END CELLS WAS COMPLETED. FEMALES APPARENTLY CONSTRUCTED ONLY ONE NEST PER YEAR IN THE NORTH; BEES EMERGED IN THE LATE SUMMER AND OVERWINTERED AS ADULTS WITH MATING TAKING PLACE IN THE SPRING. IN FLORIDA, HOWEVER, HUBBARD (IN HOWARD, 1892) REPORTED AT LEAST 2 GENERATIONS PER YEAR WITH BROODS IN FEBRUARY-MARCH AND DURING THE SUMMER. BEES WERE ACTIVE FROM NOVEMBER TO JANUARY AND FROM APRIL TO SUMMER.

**ECONOMIC IMPORTANCE:** CHANDLER (1958) LISTS 4 TYPES OF DAMAGE DONE BY CARPENTER BEES: 1) WEAKENING OF STRUCTURAL TIMBERS (AS IN FIG. 6), 2) GALLERY EXCAVATION IN WOODEN WATER TANKS (ESPECIALLY IN ARID WESTERN AREAS), 3) DEFECATION STREAKING ON HOUSES OR PAINTED STRUCTURES, AND 4) HUMAN ANNOYANCE. THE LAST POINT IS INCLUDED SINCE CARPENTER BEE FEMALES MAY STING (RARELY), AND MALE BEES MAY HOVER OR DART AT HUMANS WHO VENTURE INTO THE NESTING AREA. IN GENERAL, CARPENTER BEES ARE NOT MUCH OF A PROBLEM. IF PROBLEMS DO ARISE, THE UNIVERSITY OF FLORIDA, INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES, RECOMMENDS BLOWING A SMALL AMOUNT OF 5% CHLORDANE DUST INTO THE NESTING HOLES. SPRAY CONTAINING 2-3% CHLORDANE MAY BE APPLIED TO THE WOOD SURFACE. AFTER A FEW DAYS, THE HOLES SHOULD BE PLUGGED WITH PLASTIC WOOD, PUTTY, OR SIMILAR SUBSTANCE.

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