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ERRATA

THE FOLLOWING ADDITIONS AND CORRECTIONS SHOULD BE MADE IN THE JULY-AUGUST 1961 ISSUE OF GEOLOGIC NOTES:

- (1) FOLLOWING PAGE 44. -- THE SCALE OF FIGURE 1 IS 1" = 1.97 MI.
- (2) PAGES 43-50. -- FOR MEAN SIZE, READ MEDIAN DIAMETER. FOR CLAY, READ CLAY AND SILT.
- (3) PAGE 45, LINE 30. -- FOR 4.5, READ 0.8.
- (4) PAGE 45, LINE 36. -- FOR AND, READ TO.
- (5) PAGE 45, LINE 43. -- FOR THE SENTENCE BEGINNING KURTOSIS, READ KURTOSIS VALUES ARE APPROXIMATELY 0.25.
- (6) PAGE 46, LINE 15. -- SENTENCE SHOULD READ SKWNESS DECREASES FROM APPROXIMATELY 1.4 TO ABOUT 1.00.
- (7) PAGE 46, LINE 16. -- FOR THE SENTENCE BEGINNING THE KURTOSIS, READ KURTOSIS RANGES FROM 0.11 TO 0.21.
- (8) FOLLOWING PAGE 46, FIGURE 3.--FOR BEACH FACIES, CHANGE SKWNESS TO 0.8, KURTOSIS TO 0.25. FOR LAGOON FACIES, CHANGE SKWNESS TO 1.0, KURTOSIS TO 0.21.
- (9) NOTE. -- ALL SAMPLES WERE DRY SIEVED.

NOTES ON THE GEOLOGY AND STRUCTURE OF
OCONEE COUNTY, SOUTH CAROLINA

By

CHARLES J. CAZEAU^{1/}

INTRODUCTION

THE PURPOSE OF THIS NOTE IS TO PRESENT SOME PRELIMINARY RESULTS ON THE GENERAL GEOLOGY AND STRUCTURAL FEATURES IN OCONEE COUNTY BASED ON OBSERVATIONS MADE BY THE WRITER DURING THE SUMMER OF 1961. THE GEOLOGIC MAPPING OF OCONEE COUNTY BY RECONNAISSANCE METHODS IS ONE OF SEVERAL PROJECTS BEING CONDUCTED UNDER THE SPONSORSHIP OF THE DIVISION OF GEOLOGY, SOUTH CAROLINA STATE DEVELOPMENT BOARD. NO DETAILED INVESTIGATIONS HAVE BEEN MADE PREVIOUSLY IN THE COUNTY WITH THE EXCEPTION OF SHUFFLEBARGER'S STUDY (1961) OF THE POOR MOUNTAIN AREA WEST OF THE TOWN OF WALHALLA. THE ROCKS IN THE COUNTY ARE DOMINANTLY OF METASEDIMENTARY ORIGIN.

LOCATION

OCONEE COUNTY IS THE WESTERNMOST COUNTY IN SOUTH CAROLINA. IT IS BOUNDED ON THE WEST AND SOUTHWEST BY THE CHATTOOGA AND TUGALOO RIVERS, WHICH SEPARATE IT FROM GEORGIA, AND ON THE NORTH BY THE NORTH CAROLINA STATE LINE. PICKENS AND ANDERSON COUNTIES LIE TO THE EAST AND SOUTHEAST RESPECTIVELY. SUMTER NATIONAL FOREST LANDS OF THE BLUE RIDGE PHYSIOGRAPHIC PROVINCE OCCUPY APPROXIMATELY THE NORTHWESTERN THIRD OF THE COUNTY.

GENERAL GEOLOGY

FIVE MAJOR ROCK ZONES, OR BELTS, APPEAR TO EXIST IN THE COUNTY, GENERALLY TRENDING NORTHEAST-SOUTHWEST (FIGURE 1).

MICA GNEISS ZONE

THIS ZONE OCCUPIES THE MOST NORTHWESTERLY PORTION OF THE COUNTY, ADJACENT TO THE CHATTOOGA RIVER, AND COINCIDES WITH THE BLUE RIDGE BELT (OVERSTREET AND BELL, 1961). THE MAXIMUM WIDTH OF THIS BELT IS FOUR MILES. ROCK TYPES IN THE AREA ARE QUITE VARIABLE, POSSESSING PROBABLY THE GREATEST HETEROGENEITY OF THE FIVE MAJOR ZONES. IN ADDITION TO MICA GNEISS, A DOMINANT ROCK TYPE, EXPOSURES OCCUR OF BIOTITE AND HORNBLende GNEISS, SCHISTS OF VARYING CHARACTER, GRANITE GNEISS, AND AUGEN GNEISS. IN THE NORTHERN PART OF THE COUNTY THE

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WHITESIDE GRANITE EXTENDS SOUTHWARD ABOUT FIVE MILES, LYING BETWEEN THE MICA GNEISS ZONE AND THE ADJOINING BREVARD BELT. OVER THIS DISTANCE THE WHITESIDE GRANITE NARROWS CONSIDERABLY AND DISAPPEARS AGAINST THE BREVARD BELT.

BREVARD BELT

THIS BELT CROSSES THE TUGALOO RIVER FROM GEORGIA AND FOLLOWS A RATHER PERSISTENT NORTHEASTERLY COURSE ACROSS THE COUNTY AND INTO NORTH CAROLINA. IT ATTAINS A MAXIMUM WIDTH OF ABOUT THREE MILES BUT NARROWS SOMEWHAT TO THE NORTH. THE SOUTHERN PORTION OF THE BREVARD BELT IS CHARACTERIZED BY AN INDURATED GRAPHITIC SCHIST; FURTHER TO THE NORTHEAST, POORLY LITHIFIED RED AND GRAY MICA SCHISTS PREDOMINATE.

AUGEN GNEISS ZONE

A COARSE GRANITOID GNEISS WITH PROMINENT AUGEN OF WHITE MICROCLINE TYPIFIES THE NORTHEASTERN PART OF THIS ZONE. THIS IS THE SAME LITHOLOGY MAPPED BY C. Q. BROWN IN PICKENS COUNTY (REPORT IN PREPARATION) AND IS EQUIVALENT TO THE HENDERSON GRANITE OF NORTH CAROLINA. SOUTHWEST ALONG STRIKE THE COARSE AUGEN GNEISS GRADES INTO A FINE GRAINED PHASE OF AUGEN GNEISS WHICH IS RATHER SCHISTOSE, WITH AUGEN EITHER REDUCED IN SIZE OR ABSENT.

INJECTION ZONE

THIS ZONE CONSISTS OF DARK GRAY HORNBLende GNEISS POSSESSING DISTINCT COMPOSITIONAL BANDING. THE HORNBLende GNEISS GRADES INTO OR INTERFINGERS WITH ZONES OF GRANITE GNEISS THAT APPEARS INTRUSIVE. SOUTHWARD ALONG STRIKE THE AMOUNT OF GRANITE OR GRANITE GNEISS INCREASES. IT IS HIGHLY VARIABLE IN TEXTURE, RANGING FROM FINE TO COARSE GRAINED, WITH DISTINCT AS WELL AS POORLY DEFINED FOLIATION.

BIOTITE GNEISS ZONE

THIS IS THE MOST SOUTHEASTERLY ZONE IN THE COUNTY AND CONSISTS OF APPRECIABLE AMOUNTS OF REDDISH MICA SCHIST IN ADDITION TO THE BIOTITE GNEISS. IN PLACES, THE BIOTITE GNEISS IS GRANITOID AND SUPERFICIALLY RESEMBLES GRANODIORITE. SUBORDINATE AMOUNTS OF HORNBLende GNEISS ARE PRESENT.

STRUCTURE

STRUCTURAL ELEMENTS SHOWN IN FIGURE 1 WERE DELINEATED PRINCIPALLY FROM SEVERAL HUNDRED STRIKE AND DIP MEASUREMENTS OF FOLIATION. THE FOLIATION DIPS WITHIN THE MICA GNEISS AND BREVARD ZONES ARE REMARKABLY UNIFORM, DIPPING SOUTHEAST AND STRIKING NORTHEAST. LOCAL STEEPENING OF THESE DIPS TO AS MUCH AS 60° OCCURS WITHIN THE BREVARD BELT.

TWO MAJOR GROUPS OF FLEXURES OCCUR WITH AXES ORIENTED

MAINLY NORTHEAST. ONE SUCH GROUP OCCUPIES THE AUGEN GNEISS ZONE AND PORTIONS OF THE BREVARD BELT; THE OTHER GROUP IS MORE CLOSELY CONCENTRATED AND IS CONFINED TO THE INJECTION ZONE. THE SOUTHEASTERN FLANKS OF THESE FLEXURES CONTAIN THE MORE GENTLE DIPS.

IN CONTRAST TO THE NORTHEAST TRENDING FOLDS, A THIRD GROUP IS PRESENT IN THE SOUTHEASTERN PART OF THE COUNTY WHICH GENERALLY TREND EAST-WEST AND NORTHWEST-SOUTHEAST, MORE OR LESS PERPENDICULAR TO THE OTHER FLEXURE GROUPS. THIS AREA IS OCCUPIED BY BIOTITE GNEISS AND LITHONIA-TYPE GRANITE GNEISS. THE FOLDS OF THIS GROUP HAVE BEEN INTERPRETED AS CROSS-FOLDS. IT IS POSSIBLE THAT THEY MAY BE EXTENSIONS OF FOLDS MAPPED BY GRANT (1958) IN HART COUNTY, GEORGIA.

ALSO OF INTEREST IS A DISTINCT, NEARLY HORIZONTAL, NORTHEAST-TRENDING, CATACLASTIC(?) LINEATION PRESENT IN THE FINE GRAINED PHASE OF THE AUGEN GNEISS. THE TENDENCY OF THE FINE GRAINED GNEISS TO WEATHER INTO SLIVERS OR ROD-LIKE CHIPS APPEARS TO DEPEND UPON THE DEGREE OF DEVELOPMENT OF THIS LINEATION.

BREVARD CONTACT ZONE

THE NATURE OF THE CONTACT ZONE ON THE NORTHWEST AND SOUTHEAST SIDES OF THE BREVARD BELT IN THE NORTHERN PART OF THE COUNTY IS QUITE DIFFERENT. ALONG THE SOUTHEASTERN SIDE OF THE BREVARD THE CONTACT IS CHARACTERIZED BY A REPETITION OF BREVARD-TYPE MICA SCHIST AND FINE GRAINED AUGEN GNEISS IN ALTERNATING SEQUENCE. NO SHARP CONTACT IS INDICATED. ON THE NORTHWEST, HOWEVER, THE BREVARD SCHIST IS ABRUPTLY IN CONTACT WITH THE WHITESIDE GRANITE. THIS IS PARTICULARLY NOTICEABLE IN ROAD CUTS ALONG COUNTY ROAD 171 BETWEEN SALEM AND THE NORTH CAROLINA STATE LINE.

THE PRESENCE OF NORTH-SOUTH TRENDING FLEXURES IN THE WHITESIDE GRANITE IN OCDONEE COUNTY (FIGURE 1) AND THE ABRUPT CONTACT OF THIS LITHOLOGY WITH THE BREVARD BELT SUGGEST THE POSSIBILITY OF LARGE SCALE SHEARING IN THIS ZONE. DETAILED MAPPING IN THE AREA SHOULD YIELD FRUITFUL DATA.

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HISTORIC MAP LINKS PROGRESS IN GEOLOGY

By

L. L. SMITH^{1/}

GEOLOGISTS, OF ALL SCIENTISTS, ARE ESPECIALLY TRAINED TO EVALUATE PROPERLY THE ELEMENT OF TIME. YET WE ARE OFTEN PRONE TO CONSIDER CERTAIN CURRENT CONCEPTS AND TECHNIQUES AS BEING RECENT DEVELOPMENTS WHEREAS INVESTIGATION MAY REVEAL THAT THEIR SEEDS WERE SOWN IN THE EARLY STAGES OF THE GROWTH OF OUR SCIENCE.

GEOLOGIC MAPPING IN SOUTH CAROLINA IS BEING ACCELERATED, SOME OF IT COVERING PRACTICALLY VIRGIN AREAS AND SOME OF IT INVOLVING REFINEMENTS OF EARLIER FIELD WORK. UNIVERSITY OF SOUTH CAROLINA GEOLOGISTS, AND OTHERS, WITH THE SPONSORSHIP AND COOPERATION OF THE DIVISION OF GEOLOGY OF THE STATE DEVELOPMENT BOARD ARE UNRAVELLING THE DIFFICULT GEOLOGY OF CERTAIN SECTIONS OF THE PIEDMONT AND COASTAL PLAIN; AND GEOLOGIC MAPS OF THESE AREAS WILL BE PREPARED FOR PUBLICATION IN THE NEAR FUTURE.

IN THE LIGHT OF SUCH ACTIVITIES AN ANCIENT, TIME-WORN GEOLOGICAL MAP OF THE STATE OF NEW YORK, LONG BURIED IN THE FILES OF THE DEPARTMENT OF GEOLOGY AND GEOGRAPHY AT THE UNIVERSITY BUT NOW RESTORED AND PLACED ON DISPLAY IN THE MCKISSICK LIBRARY, ASSUMES UNUSUAL INTEREST. THIS MAP, THE FIRST OF ITS KIND EVER TO BE PREPARED, WAS PUBLISHED IN 1843 ALONG WITH A LENGTHY REPORT WRITTEN BY THE FAMOUS GEOLOGIST JAMES HALL.

THE NEW YORK ASSEMBLY IN 1836 AUTHORIZED A GEOLOGICAL SURVEY OF THE STATE WITH HALL AS ITS DIRECTOR. IN ORDER TO HASTEN THE PROGRESS OF SO GREAT A TASK, THE STATE WAS DIVIDED INTO FOUR SECTIONS WITH A REPUTABLE GEOLOGIST IN CHARGE OF EACH. ONE OF THESE MEN WAS LARDNER VANUXEM WHO ALREADY HAD GAINED CONSIDERABLE RECOGNITION FOR HIS WORK IN SOUTH CAROLINA AND ALABAMA.

VANUXEM, A NATIVE OF PHILADELPHIA AND TRAINED AT THE PARIS SCHOOL OF MINES, CAME TO SOUTH CAROLINA IN 1824 TO ACCEPT AN APPOINTMENT AS PROFESSOR OF GEOLOGY AND MINERALOGY AT THE SOUTH CAROLINA COLLEGE. IN THIS POSITION HE SUCCEEDED THOMAS COOPER WHO HAD BEGUN GIVING COURSES IN GEOLOGY IN 1819 AND RELINQUISHED SUCH DUTIES ONLY AFTER BECOMING PRESIDENT OF THE COLLEGE. COOPER SHARED WITH JAMES SILLIMAN AT YALE THE DISTINCTION OF BEING THE FIRST IN AMERICA TO TEACH THIS SUBJECT.

BESIDES HIS TEACHING SALARY, VANUXEM WAS ASSIGNED AN ADDITIONAL \$500.00 WITH THE REQUEST THAT HE TOUR THE STATE DURING COLLEGE RECESSES AND STUDY ITS MINERALS. RESIGNING IN 1826

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TO PURSUE HIS PROFESSION ELSEWHERE, THE ONLY FRUITS OF HIS WORK LEFT BEHIND WERE A REPORT TO THE NEWSPAPERS AND SOME MINERAL SPECIMENS STILL TO BE FOUND IN THE UNIVERSITY GEOLOGY MUSEUM. HOWEVER, VANUXEM'S WORK REPRESENTS THE FIRST ATTEMPTS TOWARDS GEOLOGICAL FIELD STUDIES IN SOUTH CAROLINA.

THE FIRST GEOLOGICAL SURVEY OF SOUTH CAROLINA WAS AUTHORIZED BY THE LEGISLATURE IN 1844 AND MICHAEL TUOMEY WAS APPOINTED THE FIRST FULL-TIME STATE GEOLOGIST. AFTER GRADUATING FROM RENSSALAER IN ENGINEERING, TUOMEY SPENT SOME YEARS IN NORTH CAROLINA IN THE PRACTICE OF HIS PROFESSION AND LATER TAUGHT SCHOOL IN VIRGINIA. HIS INTEREST IN GEOLOGY APPEARS TO HAVE BEEN DEVELOPED INDEPENDENTLY OF ANY FORMAL TRAINING IN THE SUBJECT. FOR FOUR YEARS TUOMEY PURSUED WITH ENTHUSIASM AND VIGOR THE TASK OF STUDYING AND RECORDING THE GEOLOGY OF SOUTH CAROLINA; AND, JUDGING BY HIS ACCOMPLISHMENTS, MOST OF HIS TIME MUST HAVE BEEN SPENT IN THE FIELD. WHEN IN 1848, HE LEFT THE STATE TO TAKE UP SIMILAR WORK IN ALABAMA, HE HAD ALREADY GAINED DISTINCTION AS AN EMINENT SCIENTIST. HIS FINAL REPORT ON THE GEOLOGY OF SOUTH CAROLINA, PUBLISHED IN 1848, WAS A CLASSIC WORK MUCH OF WHICH IS GOOD REFERENCE MATERIAL TO THIS DAY. THIS VOLUME OF NEARLY 300 PAGES WAS SUPPLEMENTED WITH A GEOLOGICAL MAP OF THE STATE. THUS THE FIRST SUCH MAP OF SOUTH CAROLINA FOLLOWED THE FAMOUS ONE OF NEW YORK STATE BY ONLY FIVE YEARS. HOWEVER, AS SHOULD BE EXPECTED, THE NEW YORK MAP REPRESENTING THE RESULTS OF SEVERAL YEARS FIELD WORK BY A TEAM OF GEOLOGISTS WAS A GREATER CONTRIBUTION TO GEOLOGY. IN FACT MANY OF THE NAMES WHICH WERE THEN APPLIED TO GROUPS OF SANDSTONE, SHALES AND LIMESTONE BECAME ESTABLISHED AND ARE STILL RETAINED TO DESIGNATE CERTAIN UNITS OF ROCKS AND PERIODS IN THE TIME SCALE. TUOMEY'S MAP BEING THE RESULT OF RAPID RECONNAISSANCE IS TODAY OF LESS INTRINSIC VALUE. YET, WHEN WE CONSIDER THAT ONE INDIVIDUAL IN SO FEW YEARS COVERED A WHOLE STATE MAKING KEEN OBSERVATIONS AND DRAWING SAGE CONCLUSIONS FROM THEM, WE ARE LED TO JUDGE HIS MAP WITH PROFOUND ADMIRATION.

SOUTH CAROLINA'S NEXT VENTURE INTO GEOLOGY CAME IN 1855 WHEN THE LEGISLATURE COMMISSIONED OSCAR LIEBER TO DIRECT A GEOLOGICAL, MINERALOGICAL AND AGRICULTURAL SURVEY OF THE STATE. OSCAR, SON OF THE RENOWNED FRANCIS LIEBER, PROFESSOR OF POLITICAL ECONOMY AT SOUTH CAROLINA COLLEGE, WAS WELL PREPARED FOR HIS ASSIGNMENT, HAVING SPENT THE YEARS 1848-50 STUDYING GEOLOGY AT GÖTTINGEN AND FREIBERG IN GERMANY. IN THE FOUR YEARS AVAILABLE TO HIM BEFORE HIS WORK WAS TERMINATED BY THE OUTBREAK OF WAR, HE LEFT A RECORD WHICH STANDS AS ONE OF THE GREAT CONTRIBUTIONS TO GEOLOGY. HIS FOUR ANNUAL REPORTS WERE ACCOMPANIED BY GEOLOGICAL MAPS ON WHICH HE LOCATED ACTIVE MINES AND USED COLORS TO SHOW THE DISTRIBUTION OF THE DIFFERENT TYPES OF ROCKS UNDERLYING THE SURFACE. HE PLANNED HIS WORK ON A COUNTY-BY-COUNTY BASIS, A SYSTEM WHICH ENABLED HIM TO INCLUDE CONSIDERABLE DETAIL ON HIS FINISHED MAPS. A TOTAL OF TEN MAPS OF PIEDMONT COUNTIES WAS COMPLETED AND PUBLISHED. GOLD AND IRON MINING WERE THEN IMPORTANT INDUSTRIES IN SOUTH CAROLINA AND LIEBER

MADE DETAILED STUDIES OF THESE DEPOSITS, CAREFULLY LOCATED THE MINES ON HIS MAPS, DESCRIBED THEIR ASSOCIATION WITH THE UNDERLYING ROCKS, AND CONSTRUCTED SECTIONS TO SHOW RELATIONS OF THE DEPOSITS TO THEIR ENCLOSING ROCKS.

OVER FORTY YEARS WERE TO ELAPSE BEFORE THE RING FROM THE GEOLOGIST'S HAMMER WAS AGAIN TO BE HEARD IN SOUTH CAROLINA. DUE LARGELY TO THE IMPORTANCE OF THE PHOSPHATE INDUSTRY, THE LEGISLATURE IN 1904 ACTIVATED ANOTHER GEOLOGICAL SURVEY AND APPOINTED EARLE SLOAN AS STATE GEOLOGIST. THE RESULTS OF SLOAN'S STUDIES WERE PUBLISHED IN A REMARKABLE VOLUME ENTITLED "CATALOGUE OF THE MINERAL LOCALITIES OF SOUTH CAROLINA." THIS WORK IS TO THIS DAY A VERITABLE ENCYCLOPEDIA OF GEOLOGICAL INFORMATION, BUT IT CONTRIBUTED LITTLE TOWARD FURTHERING THE WORK OF MAPPING SUBSURFACE GEOLOGY.

DURING THE 1880'S THE SOUTH CAROLINA BOARD OF AGRICULTURE PUBLISHED ANNUAL REPORTS DESCRIBING THE STATE'S POPULATION, INDUSTRIES, AND RESOURCES WITH SOME COMMENTS RELATIVE TO GEOLOGICAL FEATURES. THE REPORT OF 1883 IS SUPPLEMENTED BY A GEOLOGICAL MAP OF THE STATE (FIG. 1) WHICH WAS LATER TO BE GIVEN CONSIDERABLE PUBLICITY. THIS MAP WAS BASED LARGELY UPON THE WORK OF TUOMEY AND LIEBER TOGETHER WITH, POSSIBLY, SOME CONTRIBUTIONS BY EDMUND RUFFIN AND CHARLES V. SHEPARD. RUFFIN, AN AGRICULTURAL CHEMIST, AND SHEPARD, A MINERALOGIST AT AMHERST AND YALE, OFFERED COMMENTS UPON THE SOILS AND SOURCES OF LIMESTONE AND PHOSPHATE ROCK BUT THERE IS NO EVIDENCE TO INDICATE THAT THEY ADDED MATERIALLY TO THE GEOLOGICAL MAP. THIS MAP, IN ADDITION TO SHOWING THE DISTRIBUTION OF TYPES OF ROCK, DIVIDES THE STATE INTO CERTAIN REGIONS WHICH LATER BECAME WIDELY USED AS GEOGRAPHIC DIVISIONS OF THE STATE. THESE ARE THE COASTAL, LOWER PINE, RED HILL, SAND HILL, PIEDMONT AND ALPINE REGIONS. THIS MAP ADDS LITTLE TO THE GEOLOGY OF THE STATE AS DEPICTED BY TUOMEY AND LIEBER. ITS SMALLER SCALE RESULTS IN LESS DETAIL THAN IS PORTRAYED ON LIEBER'S COUNTY MAPS.

THE NEW YORK STATE MAP OF 1843, TUOMEY'S MAP, AND THE GEOLOGICAL MAPS BY LIEBER, ALTHOUGH MASTERPIECES IN THEIR TIME, ARE VASTLY INADEQUATE AS JUDGED BY PRESENT-DAY STANDARDS; AND THEIR VALUE LIES LARGELY IN THEIR HISTORIC SIGNIFICANCE.

NO GEOLOGICAL MAP CAN ENDURE AS A FINAL AND FINISHED PRODUCT. WITH THE GROWTH OF GEOLOGICAL SCIENCE AND WITH REFINEMENTS IN MAPPING, REVISIONS BECOME IMPERATIVE. TODAY GEOLOGISTS WITH SPECIALIZED TRAINING ARE STUDYING DIFFERENT SECTIONS OF SOUTH CAROLINA, SEVERAL WORKING IN THE COASTAL PLAIN AND OTHERS IN THE PIEDMONT. THEIR MAPS AND ACCOMPANYING TEXTS, WHEN PUBLISHED, WILL PORTRAY DETAILS WHICH WILL AID IN ANSWERING QUESTIONS REGARDING OUR WATER SUPPLIES, FOUNDATION ROCKS AND MINERAL RESOURCES.

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COMMON CLAYS OF THE COASTAL PLAIN OF SOUTH CAROLINA^{1/}

By

G. C. ROBINSON, B. F. BUIE, & H. S. JOHNSON, JR.

ABSTRACT

ANNUAL PRODUCTION OF THE AMERICAN STRUCTURAL CLAY PRODUCTS INDUSTRY IS CURRENTLY VALUED AT ABOUT \$375,000,000. RAPID TECHNOLOGICAL ADVANCES ARE BEING MADE IN THIS INDUSTRY, AND INCREASINGLY STRINGENT REQUIREMENTS ARE BEING PLACED ON THE RAW MATERIALS USED.

CLAY RESOURCES OF THE SOUTH CAROLINA COASTAL PLAIN INCLUDE KAOLIN CLAYS, SILICEOUS SHALE OR "FULLERS EARTH", BENTONITE, AND COMMON CLAYS. COMMERCIAL KAOLIN DEPOSITS OCCUR IN THE TUSCALOOSA FORMATION OF UPPER CRETACEOUS AGE IN THE NORTHWESTERN PART OF THE COASTAL PLAIN. SILICEOUS SHALE, OR "FULLERS EARTH" AS IT HAS BEEN CALLED, IS PRESENT IN BEDS OF EOCENE AGE IN AIKEN, LEXINGTON, CALHOUN, SUMTER, WILLIAMSBURG, AND GEORGETOWN COUNTIES. NON-SWELLING BENTONITE OCCURS OVER HUNDREDS AND POSSIBLY THOUSANDS OF ACRES IN JASPER COUNTY. COMMON BRICK CLAYS ARE PRESENT AT A GREAT MANY PLACES THROUGHOUT THE COASTAL PLAIN.

LABORATORY INVESTIGATIONS OF 42 SAMPLES OF CLAYS INDICATE THAT RESOURCES OF COMMON CLAYS SUITABLE FOR USE IN STRUCTURAL CLAY PRODUCTS ARE ABUNDANT IN THE COASTAL PLAIN OF SOUTH CAROLINA. SOME CLAYS ARE WELL SUITED FOR ALMOST THE WHOLE RANGE OF STRUCTURAL CLAY PRODUCTS. OTHER WOULD REQUIRE SELECTIVE MINING AND BLENDING OF MATERIALS TO OVERCOME DEFECTS.

INVESTIGATIONS OF THE EFFECT OF THE SAND CONTENT OF A CLAY ON ITS CERAMIC PROPERTIES INDICATE THAT A GREATER AMOUNT OF SAND IN THE MINUS 48 PLUS 100 MESH SIZE RANGE CAN BE TOLERATED THAN CAN COARSER OR FINER SAND. REMOVAL OF SAND BY WASHING GREATLY INCREASES THE DRY AND FIRED STRENGTHS OF CLAYS AND COMMONLY RESULTS IN A LOWER MATURING TEMPERATURE, REDUCED ABSORPTION, AND SMOOTHER SURFACES AFTER FIRING.

^{1/} ROBINSON, G. C., BUIE, B. F., AND JOHNSON, H. S. JR., 1961, COMMON CLAYS OF THE COASTAL PLAIN OF SOUTH CAROLINA: BULL. 25, DIVISION OF GEOLOGY, S. C. STATE DEVELOPMENT BOARD, COLUMBIA.

GEOLOGY OF THE FORT JACKSON NORTH QUADRANGLE, S. C. 1/

By

W. K. POOSER AND H. S. JOHNSON, JR.

ABSTRACT

THE FORT JACKSON NORTH 7½ MINUTE QUADRANGLE IS IN THE FALL LINE ZONE AT THE NORTHWESTERN EDGE OF THE COASTAL PLAIN PROVINCE IMMEDIATELY NORTHEAST OF COLUMBIA, S. C. MAXIMUM RELIEF IN THE AREA IS ABOUT 370 FEET, AND THE HIGHEST ELEVATION IS 515 FEET ABOVE SEA LEVEL.

ROCKS IN THE QUADRANGLE INCLUDE METAMORPHOSED SEDIMENTARY AND VOLCANIC ROCKS OF EARLY PALEOZOIC OR LATE PRECAMBRIAN AGE (CAROLINA SLATE GROUP) IN THE NORTHWESTERN PART OF THE AREA AND UNCONSOLIDATED SAND, CLAY, AND GRAVEL OF UPPER CRETACEOUS (TUSCALOOSA FORMATION) AND YOUNGER AGE OVER THE GREATER PART OF THE MAP AREA. THE METAMORPHIC ROCKS ARE PART OF THE PIEDMONT PHYSIOGRAPHIC PROVINCE, AND THE UNCONSOLIDATED SEDIMENTS ARE PART OF THE COASTAL PLAIN PROVINCE. PALEOZOIC GRANITE STOCKS AND TRIASSIC(?) DIABASE DIKES INTRUDE THE PIEDMONT ROCKS.

OVER LARGE PORTIONS OF THE NORTHERN HALF OF THE QUADRANGLE BUFF TO CREAM COLORED FINE TO COARSE GRAINED SAND IN DEPOSITS UP TO 90 FEET THICK UNCONFORMABLY OVERLIES THE TUSCALOOSA FORMATION. THIS SAND IS PREDOMINANTLY EOLIAN IN ORIGIN BUT IN PLACES IS WATER LAID. PREVAILING WINDS WERE FROM THE WEST. THE AGE OF THE SAND UNIT IS NOT KNOWN BUT IT IS AT LEAST POST EOCENE AND MAY BE MUCH YOUNGER.

MINERAL RESOURCES IN THE FORT JACKSON NORTH QUADRANGLE INCLUDE SHALE, KAOLIN, CLAYEY SAND, AND SAND. GROUND WATER YIELDS UP TO SEVERAL HUNDRED GALLONS PER MINUTE ARE OBTAINABLE FROM THE TUSCALOOSA FORMATION IN THE SOUTHEASTERN PART OF THE MAP AREA.

1/ POOSER, W. K., AND JOHNSON, H. S. JR., 1961, GEOLOGY OF THE FORT JACKSON NORTH QUADRANGLE, S. C.: MS-3, DIVISION OF GEOLOGY, S. C. STATE DEVELOPMENT BOARD, COLUMBIA.

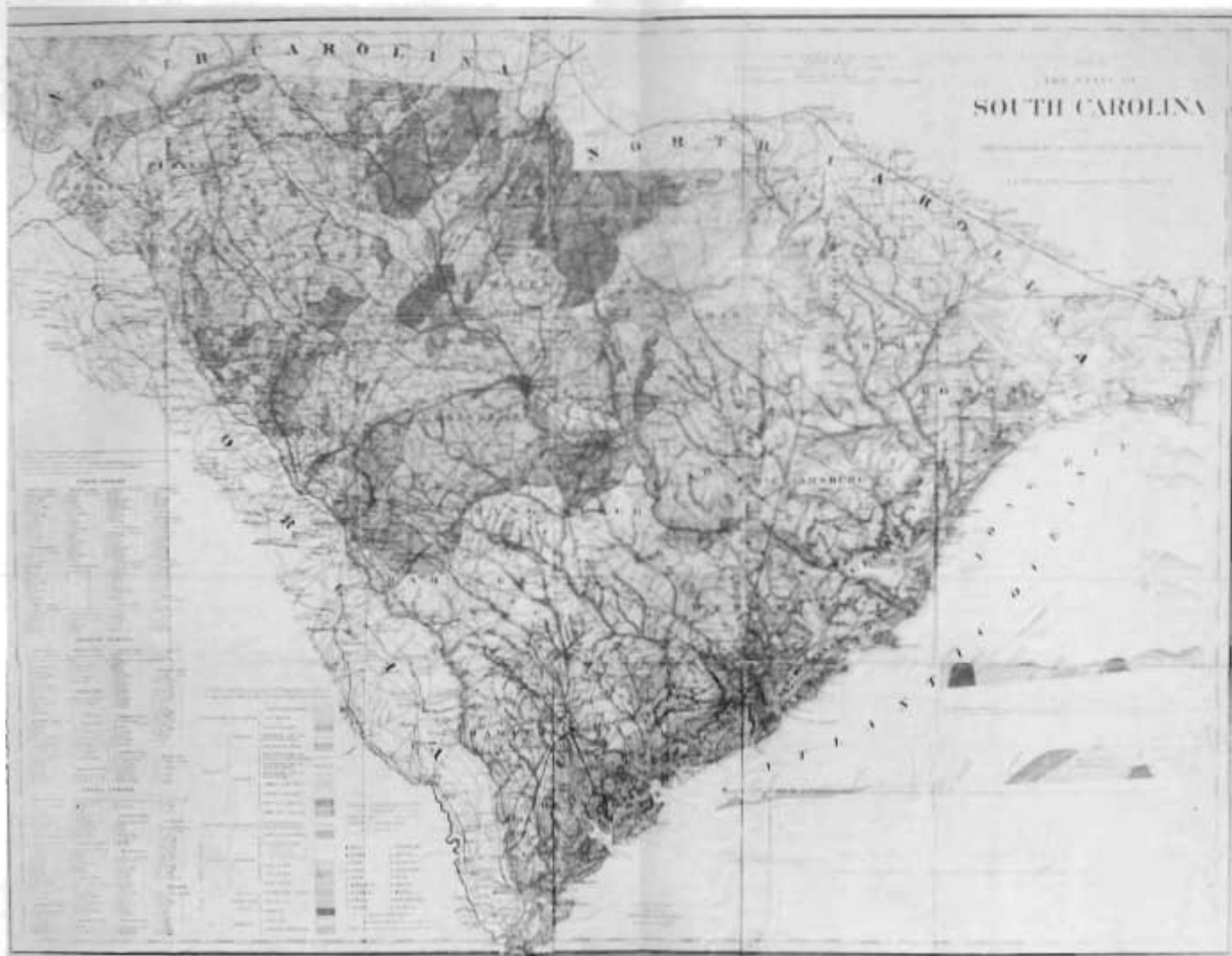


FIG. 1. GEOLOGICAL MAP OF SOUTH CAROLINA PUBLISHED IN 1883 WITH ANNUAL REPORT OF S. C. DEPARTMENT OF AGRICULTURE. GEOLOGY BASED ON WORK OF MICHAEL TUOMEY AND OSCAR LIEBER.

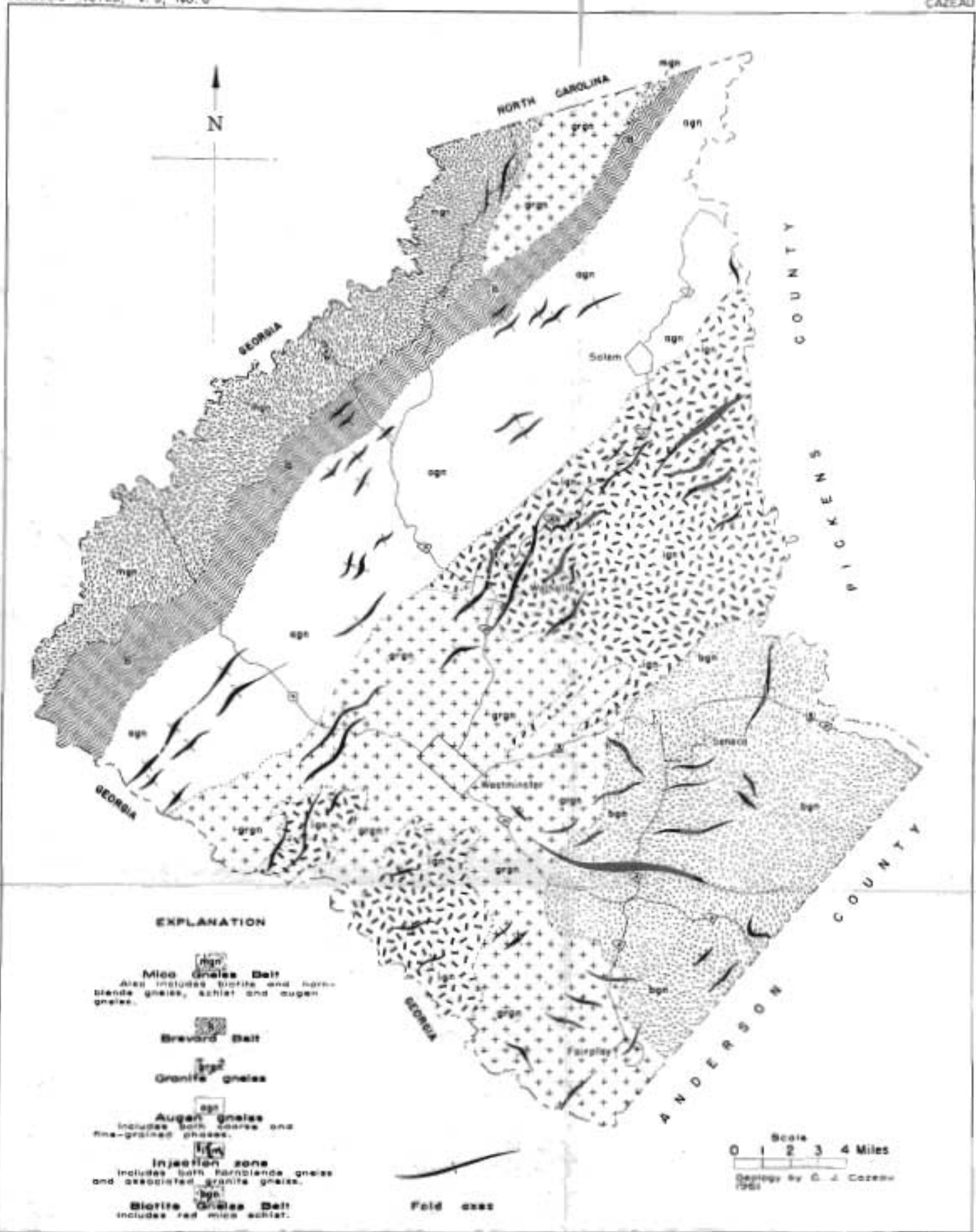


Fig. 1. Generalized geologic map of Oconee County, South Carolina.

SHALD 50 M. C. SHALD

