

led the Cretaceous Caribbean geo-

and most of the metamorphism, oc-
ynchronous with the first orogenesis
Caribbean islands, and took place long
es.

It as a whole and symmetrical to the
Caribbean islands. This suggests differ-
ence with reference to its borders. The
the prevailing trend of the fold axes.
localized deep trough-shaped basins

time near the end of Paleogene time,
orders the Western Caribbean Moun-
east of the island of Borracha,
Mountains.

Neogene time, produced most of the

major and minor orogenic movements,
paper.

ELLE HAMBURGER

stitute of Technology

space group $H6_3$ and has cell edges,
 $SiSiO_4$.

a filtered copper radiation were deter-
Harker syntheses were prepared and
is permitted location of all the metal
located by this method.

phases, a preliminary electron-density
oxygen locations. Employing the new
a new electron-density map was pre-
pared arrived at.

onal Harker syntheses, $P(x_1y_1z)$, and
jections through planar sections, such
ws:

y	z (approximate)
0	0
$\frac{2}{3}$	.82
$\frac{2}{3}$	.18
$\frac{2}{3}$	0
.43	0
.33	.33
.33	.67
.33	.50
.52	.75
.52	.25
.28	.25
.28	.75

The structure of nepheline proves to be based upon the tridymite structure, with NaAl substituted for half of the Si atoms, as originally predicted by Schiebold. The Na_1 (= K) atoms occupy large holes, and the Na_2 atoms occupy smaller holes produced by collapse of voids in the tridymite structure. Chemical analyses bear out the view that two of the eight alkali atoms are potassium and not sodium, so that the formula of nepheline is ideally $KNa_3Al_4Si_4O_{18}$.

The implication diagram $I6(xy\frac{1}{2})$ provides evidence for assuming that the atoms on the three-fold axes are in motion.

SOME ASPECTS OF THE SPECIES CONCEPT IN THE LIGHT OF QUANTITATIVE PALEONTOLOGY

BENJAMIN H. BURMA

University of Wisconsin, Madison, Wis.

Certain differences in the species concept appear when viewed from the standpoint of the newer quantitative paleontology instead of the traditional qualitative paleontology. Two such differences are discussed: (1) It is concluded that there are objective criteria for establishing how many species may be recognized in a given evolutionary line; and (2) it is shown that the criteria usually used to distinguish between species from the same horizon and locality are suspect, and a recent attempt to do so is discussed.

TERTIARY AND QUATERNARY GEOLOGY OF THE TUSAS-TRES PIEDRAS AREA, NEW MEXICO

ARTHUR P. BUTLER, JR.

U. S. Geological Survey, Washington 25, D. C.

The Tusas-Tres Piedras area includes 500 square miles in the Rio Grande depression and in the southeast extension of the San Juan Mountains in north-central New Mexico.

Tertiary rocks resting on a basement of pre-Cambrian rocks include the Conejos and Treasure Mountain formations (Potosi volcanic series), the Los Pinos and Santa Fe formations, and the Hinsdale volcanic series. The first three consist of stream-laid debris, largely of volcanic origin, and pyroclastic and effusive quartz latite, rhyolite, and basalt. The Santa Fe formation is a basin deposit composed largely of sandstone. The Hinsdale volcanic series consists of two basaltic formations and a basin deposit composed of interbedded basaltic lava and gravel, younger than the Santa Fe.

Areal mapping and investigation of the volcanic stratigraphy resulting in redefinition and subdivision of the Los Pinos show (1) no appreciable unconformity between it and the Potosi series, (2) that it is partly older than and partly contemporaneous with the Santa Fe formation (upper Miocene to lower Pliocene), (3) that its material was supplied largely by contemporaneous vulcanism rather than by erosion of older rocks, and (4) that the Hinsdale volcanic series is unconformable on both the Los Pinos and Santa Fe formations. This unconformity probably merges with the San Juan peneplain, which was previously considered older than the Los Pinos formation.

Eastward tilting and displacement on a group of related normal faults deformed the Tertiary rocks, both before and after accumulation of the Hinsdale volcanic series.

MODERN POLYGONBODEN FORMATION IN MAINE*

ARTHUR P. BUTLER, JR. AND LOUIS L. RAY

U. S. Geological Survey

In April 1939, well-developed polygonboden were observed at an elevation of 1025 feet on Cadillac Mountain, Mount Desert Island, Maine. Polygonboden have been previously described in this area at somewhat higher elevations by R. L. and Frances Nichols. They have suggested that these features might be found as low as sea level and are "undoubtedly being formed at the present time."

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The polygonboden are developed in glacial till in shallow bedrock basins on a glacially smoothed relatively horizontal surface. The polygons in general range from 1 to 2 feet in diameter; the maximum depth to bedrock is about 2 feet. To determine subsurface structure and conditions of the frozen ground, a large area was dug out to bedrock where the material was thickest.

Butler revisited the area in June 1940, at which time no change was noted in the disturbed material. However, in August 1946, when he again revisited the area, an incipient polygonal structure of less perfection than that previously observed had begun to reappear in the disturbed material. The unsorted character of the material, location in shallow bedrock basins, which form a solid base and catchment areas for water, the great number of days in which the temperature crosses the freezing point, the relatively high precipitation, and the lack of vegetative cover provide ideal conditions for the production of this feature of frost action.

CYCLOTHEM SYSTEM OF DETAILED PENNSYLVANIAN CLASSIFICATION AS APPLIED TO PENNSYLVANIAN STRATA IN ILLINOIS

GILBERT H. CADY

Illinois Geological Survey, Urbana, Illinois

The cyclothem theory during the past 12 years has been extensively applied to the Pennsylvanian beds in Illinois. Results of a study of numerous cores of diamond-drill holes and other studies since 1942 support the validity of the cyclical concept but indicate that the full cyclical sequence has not been listed. The main consideration, however, is whether or not its use has assisted in the solution of stratigraphic and classification problems. Certain proposals concerning the classification and correlation of the McLeansboro group have been advanced as though they marched under the banner of the cyclical theory, but they are actually based upon concepts unrelated or only remotely related to the theory. Even so, because of the manner of their proposal, the fact that the proposals proved in error tends to discredit the cyclical theory, whereas within its restricted field of usefulness this concept seems valid. The usefulness of the concept resides almost solely in the nearly complete invariability of the standard order of deposition and in the effect of this high degree of invariability in emphasizing exceptions. Otherwise it has little or no stratigraphic importance or usefulness in correlation, although exceptions may be stratigraphically significant. Correlation still requires the application of conventional procedure in Pennsylvanian studies, and cyclical sedimentation is not one of the criteria of such procedure.

STRUCTURES IN THE EAST BORDER OF THE COLVILLE BATHOLITH, WASHINGTON

CHARLES D. CAMPBELL

Harvey Road, Pullman, Wash.

The east border of the Mesozoic (?) Colville granitic batholith, in east-central Ferry County, has features in common with that part of its border described by Waters 60 miles to the west.

Foliation forms a dome 12 miles wide, elongated northeast parallel to regional fold axes. Along the axis and northwest side of the dome, the foliation is faint and locally highly distorted. Pegmatite is abundant, and the overlying quartzites and mica-sillimanite schists widely granitized. Extensive *lit-par-lit* gneisses, locally forming pygmatic folds, may be the result of partial replacement of sedimentary rocks, but a sill of gneissic granitic rocks 5000 feet thick, which forms the outer shell of the batholith, is probably truly igneous.

This shell is platy and dips southeast conformably beneath slightly metamorphosed sedimentary rocks. The batholith is mylonitized for several hundred feet from its contact, but, of all the sedimentary types, only the quartzite shows strain shadows and granulation. East-pitching lineation appears as fine grooving in granitic rocks and quartzite, and as an alignment of *c*-axes in quartzite and hornblende schist.