THE ESSENTIAL NONEXISTENCE OF THE EVOLUTIONARY-UNIFORMITARIAN GEOLOGIC COLUMN: A QUANTITATIVE ASSESSMENT

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This article is a systematic and quantitative demonstration of global distributional tendencies of the evolutionary-uniformitarian geologic column.

Maps have been drawn to show the worldwide distributions of all ten geologic periods on all seven continents, and such maps have also been drafted to show complete segments of the geologic column in place.

Calculations have been performed to measure successional tendencies of geologic periods over the earth. For example, it has been found that two-thirds of the earth's land surface has 5 or fewer of the 10 geologic periods in place, and only 15-20% of the earth's land surface has even 3 geologic periods appearing in "correct" consecutive order.

These and similar findings have been briefly related to the Creationist-Diluvialist paradigm.

PLAN OF THIS ARTICLE

Introduction
I. Procedures Utilized in Measuring the Factuality of the Geologic Column.
II. Exposition and Discussion of Results.
III. Probable Diluvial Significance of Global Stratigraphic Trends.

Introduction

A major foundation of the evolutionary-uniformitarian paradigm is the geologic column. This column, presented as fact, purports to demonstrate that the earth and its life have been evolving and that the earth's sedimentary strata contain the resultant biochronologic "onion skins."

A bit of wisdom for geologists is given by Park and MacDiarmid[1], who said: "The final test of all theories and hypotheses in geology is their applicability in the field." Accordingly, Creationists-Diluvialists have long pointed out that the evolutionary-uniformitarian geologic column does not correspond to reality and that fossiliferous strata must be understood as non-evolutionary, mutually-contemporaneous, cataclysmically-formed Noachian Flood deposits.

The works of Price,[2] Nelson,[3] Whitcomb and Morris,[4] and Burdick[5] have called attention to the fact that geologic periods rocks tend to be absent, inconsistent in their stratigraphic successional order from place to place, and all exhibiting some tendency to rest directly upon Precambrian "basement." Clark,[6] on the other hand, noted that there are places where much of the geologic column can be seen in place and in "correct" order.

The purpose of this work is to examine the earth's land surface (although oceans and continental shelves are also considered) in order to determine the degree of correspondence of the geologic column with reality. This study of "the geologic column as it really is" involves the quantitative measure of: 1) the tendency of the earth's land surface to have rocks of many alleged geologic periods in place versus the opposite tendency, and 2) the actual modes of stratigraphic succession of rocks attributed to different geologic periods.

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I. Procedures Utilized in Measuring the Factuality of the Geologic Column

Data were gathered in order to present maps showing the distribution on all seven continents of rocks attributed to all ten geologic periods; a separate map for each geologic period (Maps 1-10).

Fidelity to areas on the maps was guaranteed by using Lamberts Azimuthal Equal-Area Projection on the base map used throughout this work. Maps of separate continents were reduced and placed next to each other to eliminate oceanic areas so that the largest possible dimensions of continents capable of being fitted onto a *Quarterly* page could be utilized. The use of separate continents, obtained from several sources,[7,10] reduces the perspective distortion that would result had the continents been bunched together from a single world map. (The bunching together of continents, a space-saving measure, is not at all intended to be an endorsement of the "new global tectonics.") The base map has a scale of one inch to 1530 miles, or one centimeter to 969 kilometers.

Much of the basic data for this work is derived from the works of a Soviet team of geologists headed by Alexander Ronov. They compiled data on all ten geologic periods, showing distribution, thicknesses, gross petrologic compositions, and inferred paleoenvironmental conditions of formation. Volcanic and volcano sedimentary formations were included, but evidently not postorogenic granites. Recently, Ronov *et. al.*[11] pointed out that some of their much earlier works are in need of revision. Accordingly, they have been updated partly by more recent works. Recent data for Antarctica has been added.

The geology of Antarctica is poorly known for east Antarctica because of the glacial cover. It is, however, probably mostly exposed Gondwana Shield. Whatever Phanerozoic rocks there are unaccounted for beneath the ice cap would not change the figures in this work by more than several per cent.

The errors in this work should favor the uniformitarian geologic column. Only a small part of the lower, medial, or upper portions of a geologic period need be present for the area to count as having that geologic period represented there. One thickness category used by the Ronov *et. al.* team, 0-100 meters, permitted areas to be exaggerated because scattered outliers would give entire areas having them credit for having those geologic periods.

It also appears that the Ronov *et. al.* team was generous in giving credit as to the representation of geologic periods to areas having rocks metamorphosed beyond biostratigraphic recognition. For instance, Ben-Avraham and Emery[12] wrote that Indonesion geology is poorly known and that the oldest fossiliferous formations are middle and late Paleozoic, resting upon crystalline schists. Yet from maps 1-3 it is evident that the Ronov *et. al.* team gave blanket credit for Indonesia having complete Lower Paleozoic despite the unknown biostratigraphic age of the schists.

The presumed geologic periods necessarily differ in their areal extent because there is no reason to believe that sedimentation and tectonic rates would be constant. Geologic periods also differed considerably in duration, ranging from only 40 million years for Silurian and Triassic to 100 million years for the Cambrian according to the scale of Braziunas.[13]

Data for making the map for world Cambrian (Map 1) were taken from Ronov *et. al.*[14,15] except that an addition was made for the Antarctic Cambrian.[16] The work of Ronov *et. al.*[17,18] on the Ordovician was used to draw that map (Map 2), while another work by Ronov *et. al.*[19,20] was utilized to show the world's Silurian (Map 3). No Ordovician or Silurian rocks are known from Antarctica, but Maps 2 and 3 have been drawn to show areas where Ordovician and Silurian is suspected, according to Burrett,[21] and Veevers,[22] and Elliot.[23] Recent palynostratigraphic work by Kyle[24] has cast unfavorable light upon another area being Silurian, and so it has not been shown as Silurian.

The map for Devonian (Map 4) used partly an old work by Ronov *et. al.*[25] which was extensively updated using the works of House,[26] Spasskiy,[27] Brinkmann,[28] Kummel,[29] Brown et. al.,[30] Hermes,[31] Cook and Bally,[32] Miall,[33] and Churkin.[34] Sources for Antarctic Devonian are Boucot,[35] Elliot,[36] and Barrett *et. al.*[37]

Carboniferous data for making the map (Map 5) were taken from Ronov *et. al.*[38] and from the more recent works of Churkin,[39] Brown *et. al.*,[40] Hill,[41] Ross,[42] Rocha-Campos,[43] Ross,[44] Meyerhoff,[45] Kummel,[46] Cook and Bally,[47] and Stocklin.[48] The map for Permian (Map 6) was drafted utilizing the work of Ronov *et al.*[49] on Permian, as well as more recent works by Rocha-Campos,[43] Meyerhoff,[45] Stocklin,[48] Audley-Charles,[50,51] Meyerhoff and Meyerhoff,[52] Miall,[53] Brown *et. al.*,[54] Oftedahl,[55] Kummel,[56] Gobbett,[57] Cook and Bally,[58] and Churkin[63]. The PermoCarboniferous of Antarctica was drafted using data from Barrett,[37,59,60] Elliot,[61] and Kemp.[62]

Ronov *et. al.s'*[64] work on the Triassic was used in drawing Map 7, with minor modifications from the works of Audley-Charles,[51] and Brown *et. al.*[65] Sources of Antarctic Triassic data used were from the works of Barrett *et. al.*,[37] Plumstead,[66] and Elliot.[67] Map 8 (Jurassic) was drawn utilizing the work on Jurassic by Ronov *et.al.*[68] with a minor updating based on Audley-Charles.[51] Antarctic Jurassic data came from Elliot.[69,70]

The map for Cretaceous (Map 9) was drawn from the maps in the work of Ronov *et. al.*,[71,72] except that additions for Antarctica were made from the works of Elliot,[23,69] Grikurov *et. al.*,[73] and Drewry.[74] (Drewry presented geophysical evidence for the presence of sedimentary basins under the east Antarctic ice cap, and both Drewry and Grikurov had conjectured the presence of Cretaceous-Tertiary formations there. These areas are shown in Maps 9 and 10 with question marks.)

Ronov *et. al.'s*[75,8] works on the Tertiary were used to construct the map (Map 10). Sources of Antarctic Tertiary besides the previously-mentioned works of Grikurov *et. al.*,[73] and Drewry[74] (plus the estimates of Behrendt[79]), were the works of Elliot[69] and Dort.[80]

The intersections of Map 1 (Cambrian), Map 2 (Ordovician), and Map 3 (Silurian) were drafted as Map 11 (Complete Lower Paleozoic). The intersections of Map 4 (Devonian), Map 5 (Carboniferous), and Map 6 (Permian) were drawn as Map 12 (Complete Upper Paleozoic). Map 13 (Complete Paleozoic) is the intersection of Maps 11 and 12, while Map 14 (Complete Mesozoic) is the intersection of Map 7 (Triassic), Map 8 (Jurassic), and Map 9 (Cretaceous). Map 15 (Complete Geologic Column) is the draft of the intersection of Map 10 (Tertiary) with Maps 13 and 14.

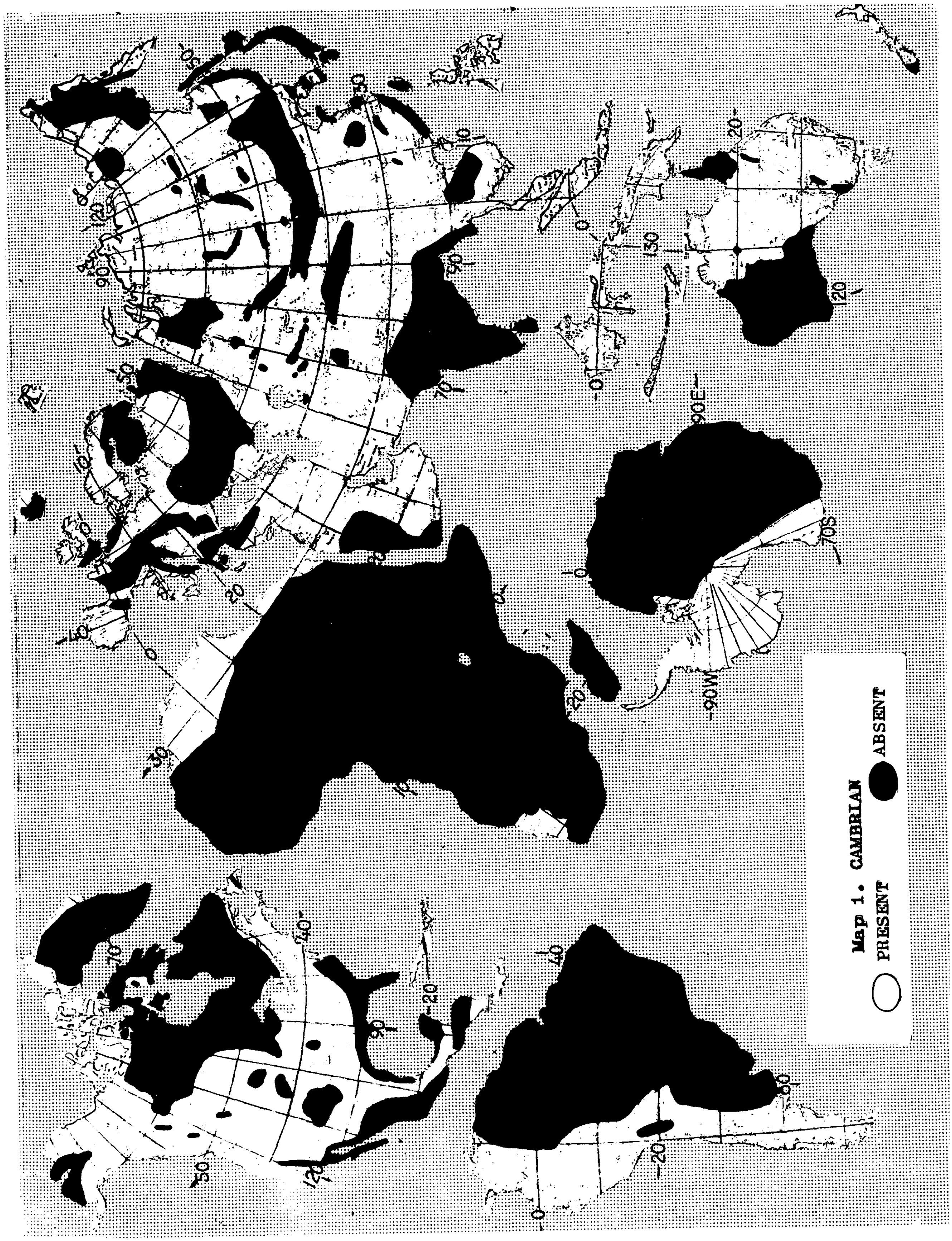
The earth's land surface was divided into 967 squares of equal area (each square being 252 x 252 miles or 406 x 406 kilometers) for the purpose of performing calculations on the areal tendencies of geologic periods. These square areas were given Cartesian coordinates (but letters instead of numbers) as is shown over a blank base map (Map 16).

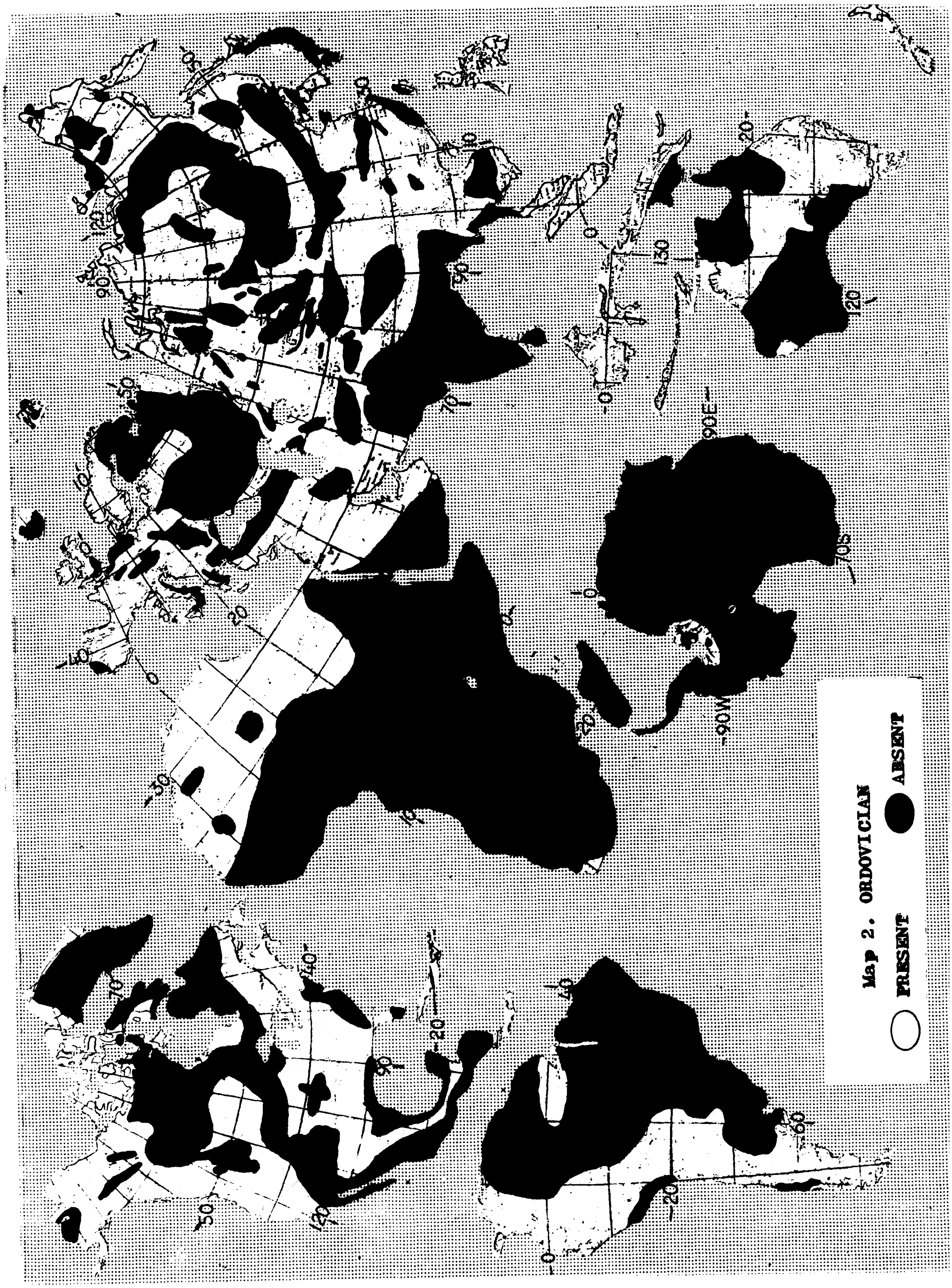
A transparency identical to the one superimposed over a blank base map (Map 16) was thus superimposed over Maps 1 through 10, and the preponderant presence or absence of rocks attributed to the ten geologic periods in these 967 square areas was entered into Table 1.

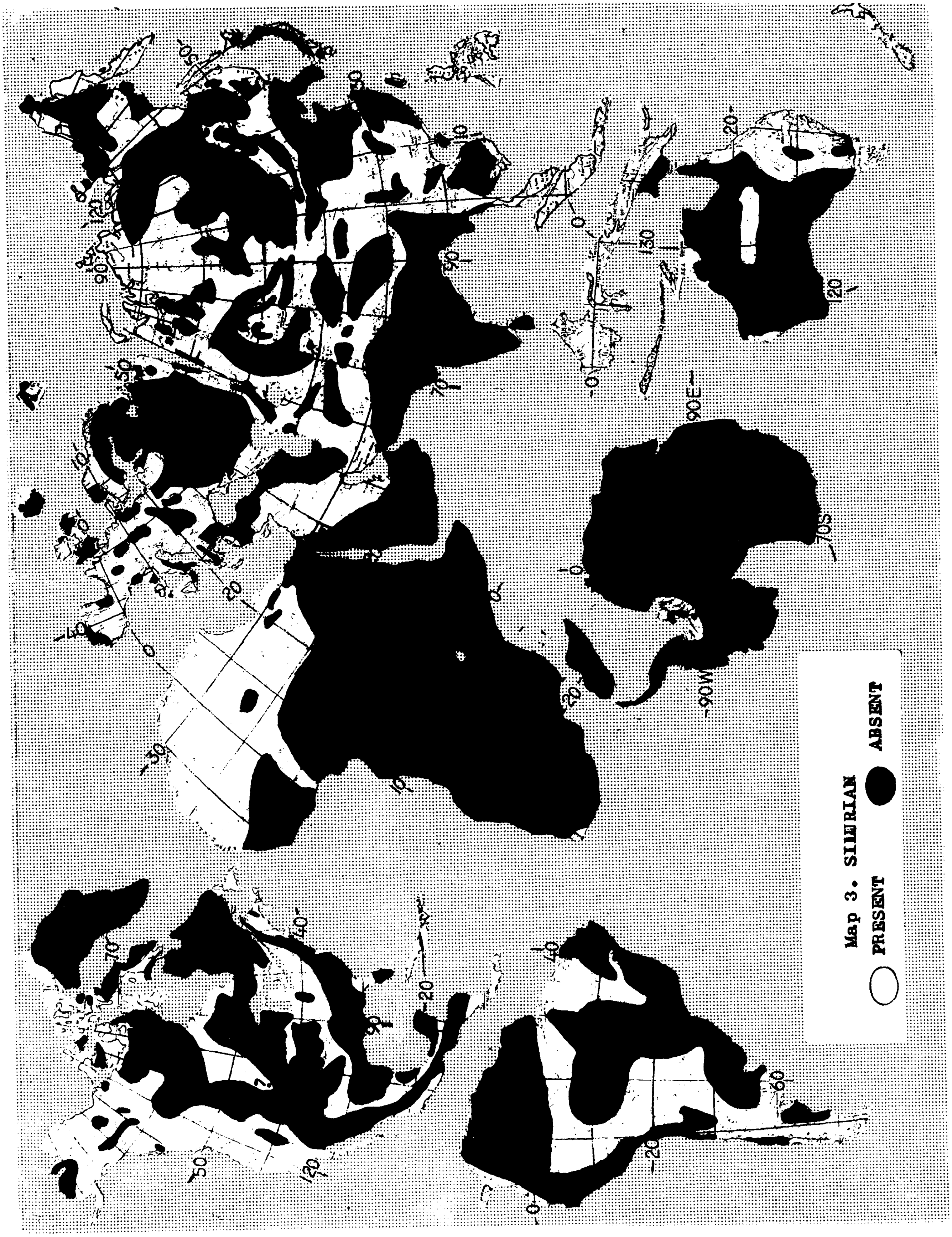
The numbers of geologic periods lithologically represented in each square were written after every row in Table 1. All the raw data in Table 1 was expressed as a percentage of all 967 squares (the entire earth's land surface). Figure 1 was drawn to show what percentage of the earth's land surface has how many geologic periods represented. Figure 2 shows what percentage of the earth's land surface has what particular sequence of consecutive geologic periods represented. Table 2 shows what percentage of a given geologic period (in terms of total subaerial terrestrial areal distribution) rests on what geologic period that is older than that given geologic period. This includes the percentages (of all ten geologic periods) resting directly upon Precambrian "basement."

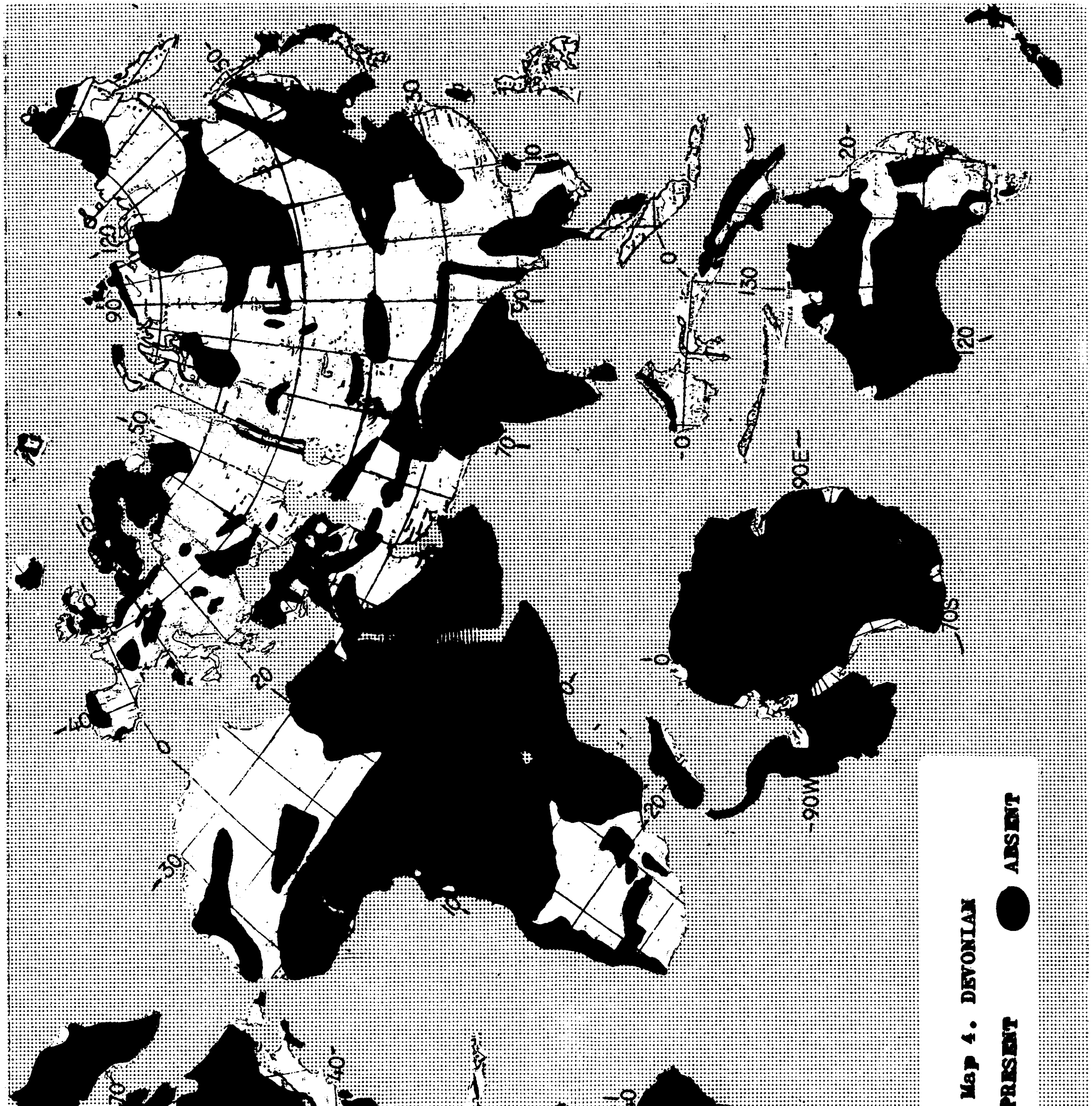
II. Exposition and Discussion of Results

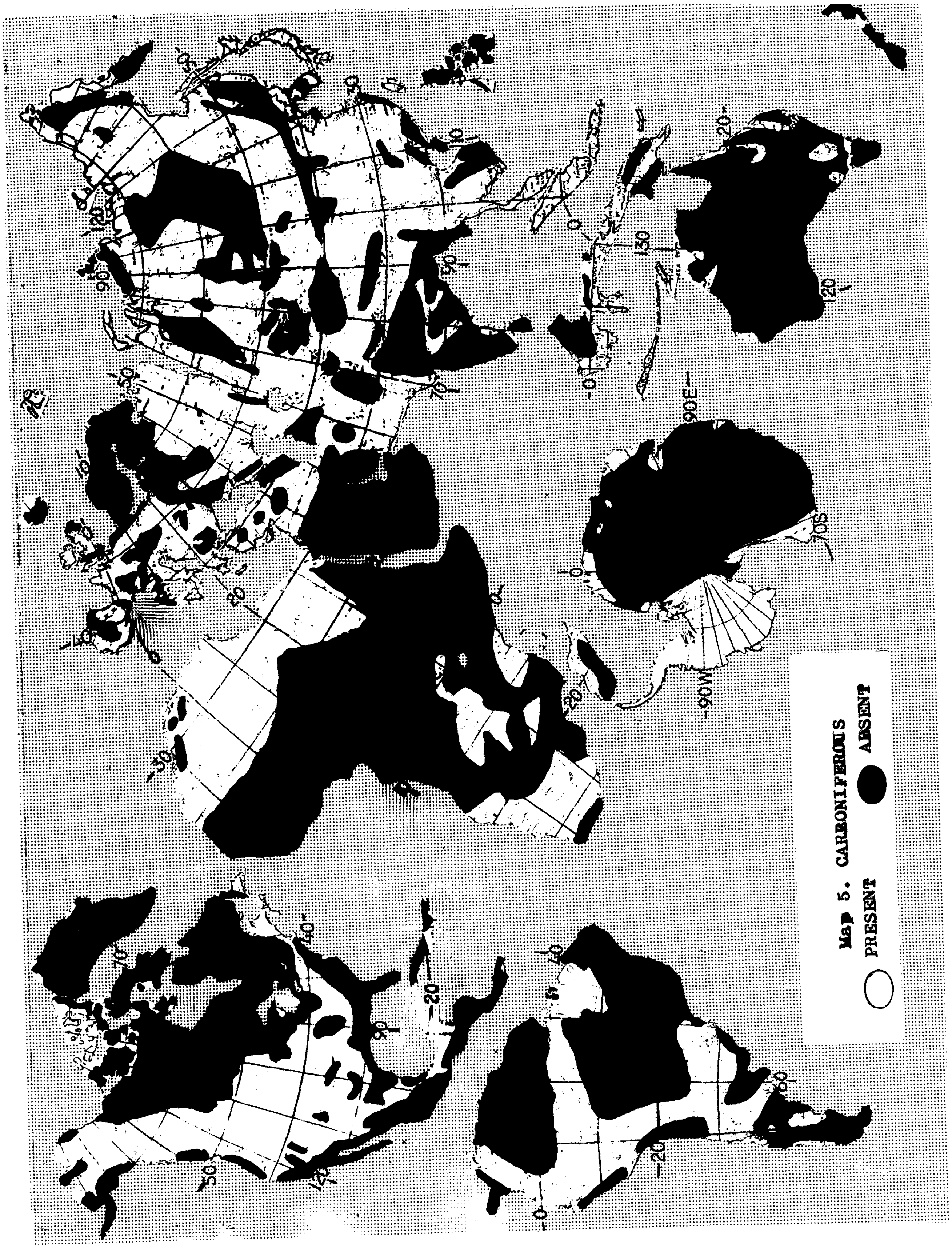
From maps 11, 12, and 14, it is obvious that the


Map 1. CAMBRIAN
PRESENT
ABSENT


Map 2. ORDOVICIAN
PRESENT
ABSENT

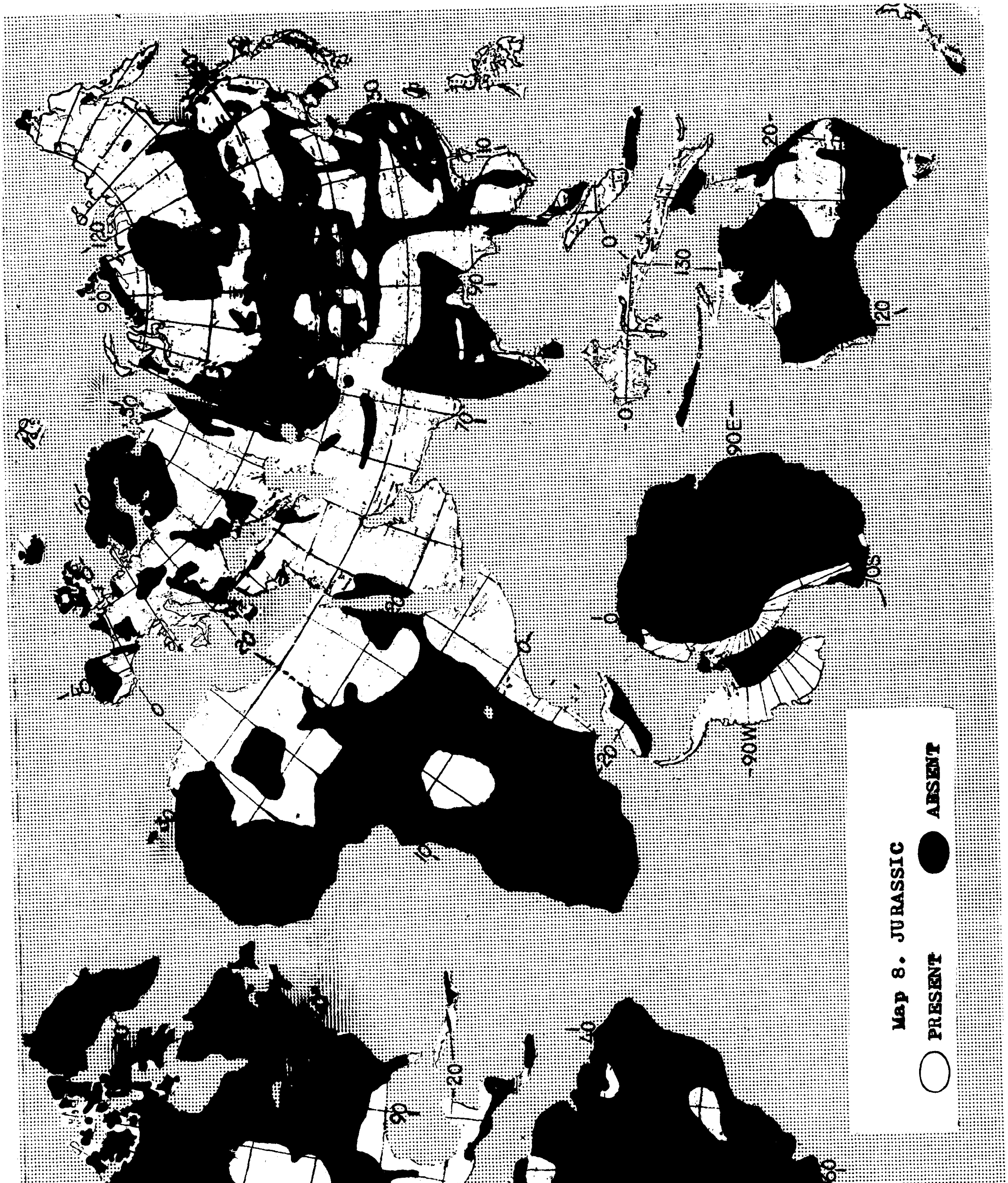

Map 3. SILURIAN
PRESENT
ABSENT

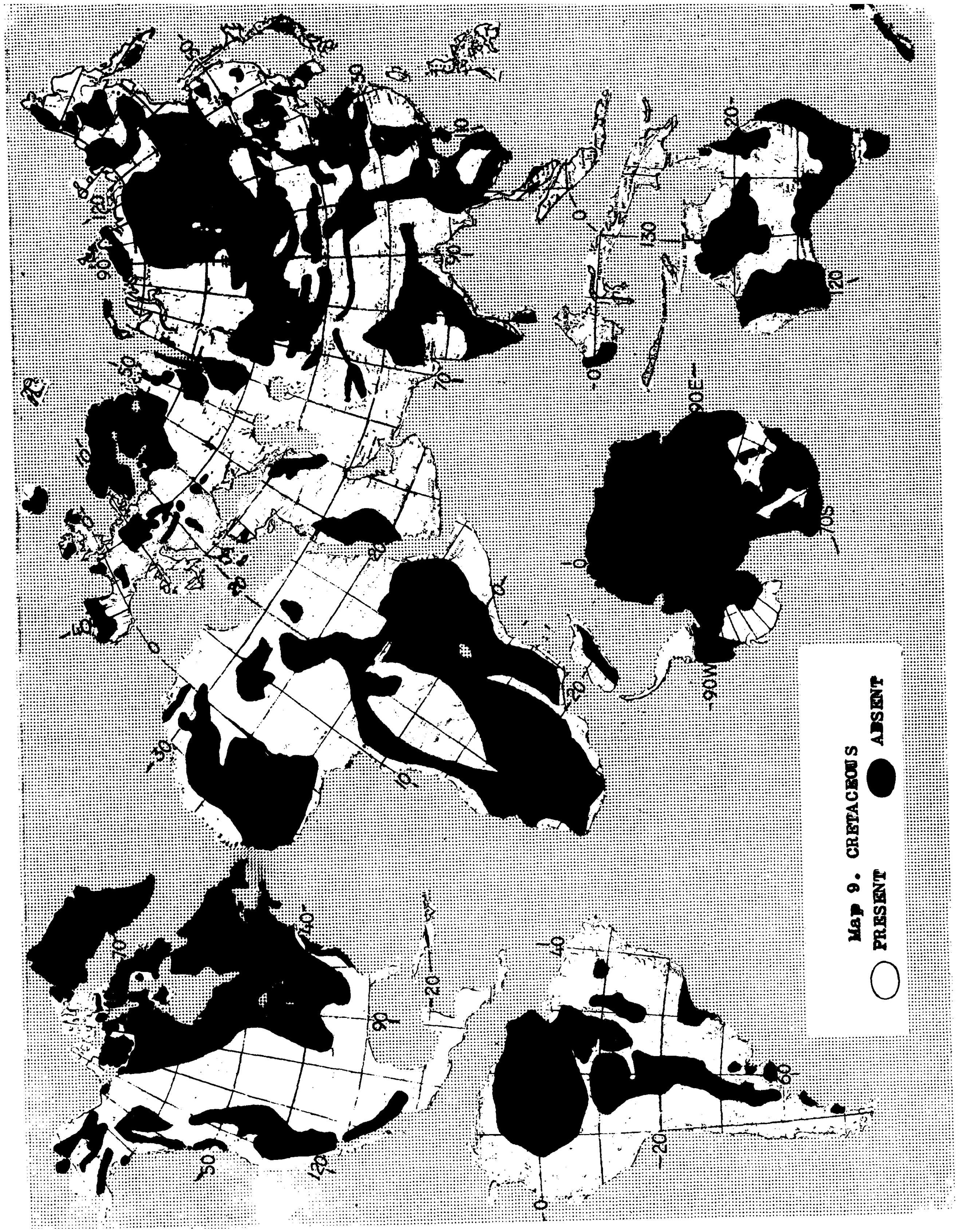

Map 4. DEVONIAN
PRESENT
ABSENT

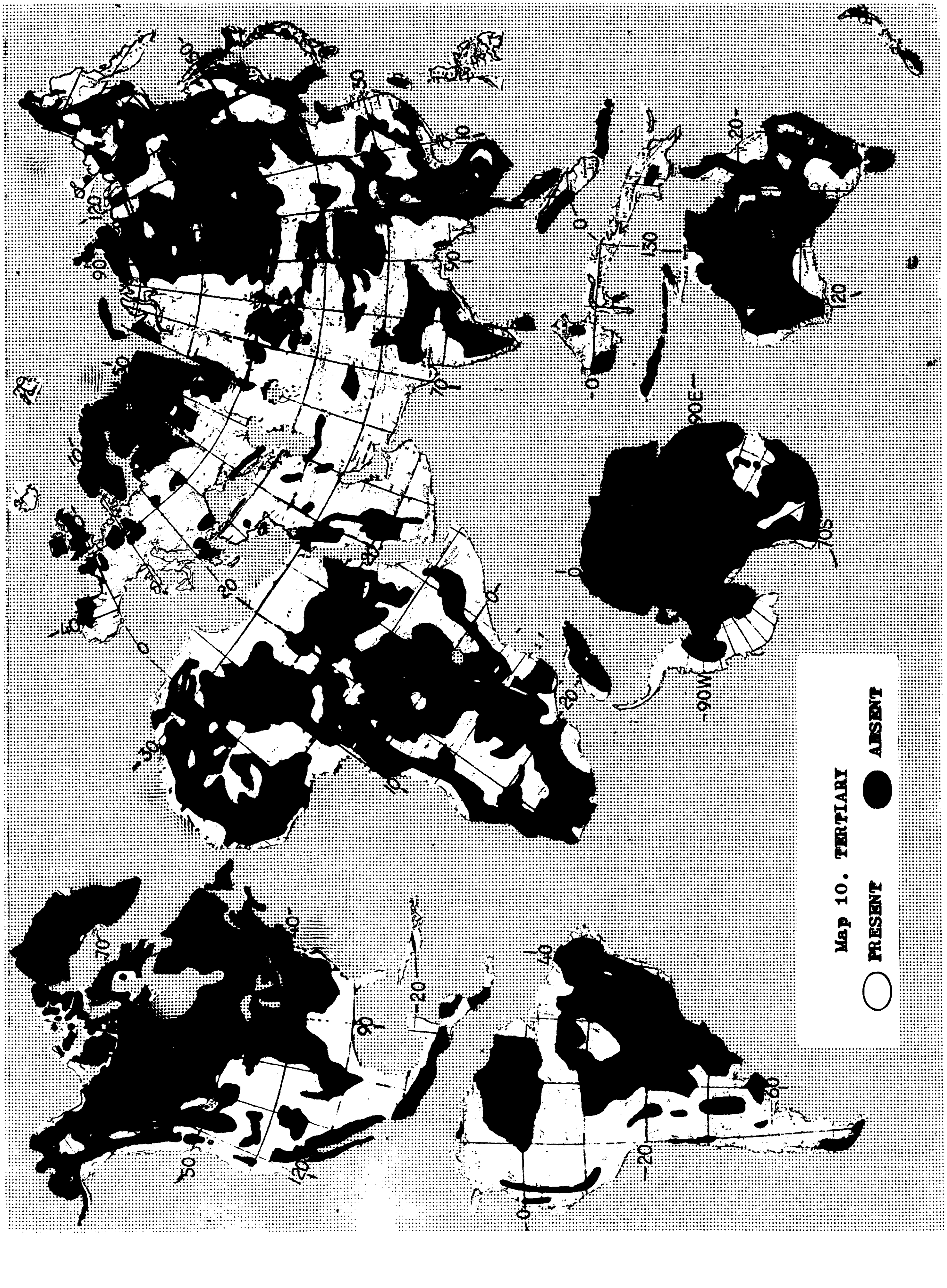

Map 5. CARBONIFEROUS
PRESENT
ABSENT

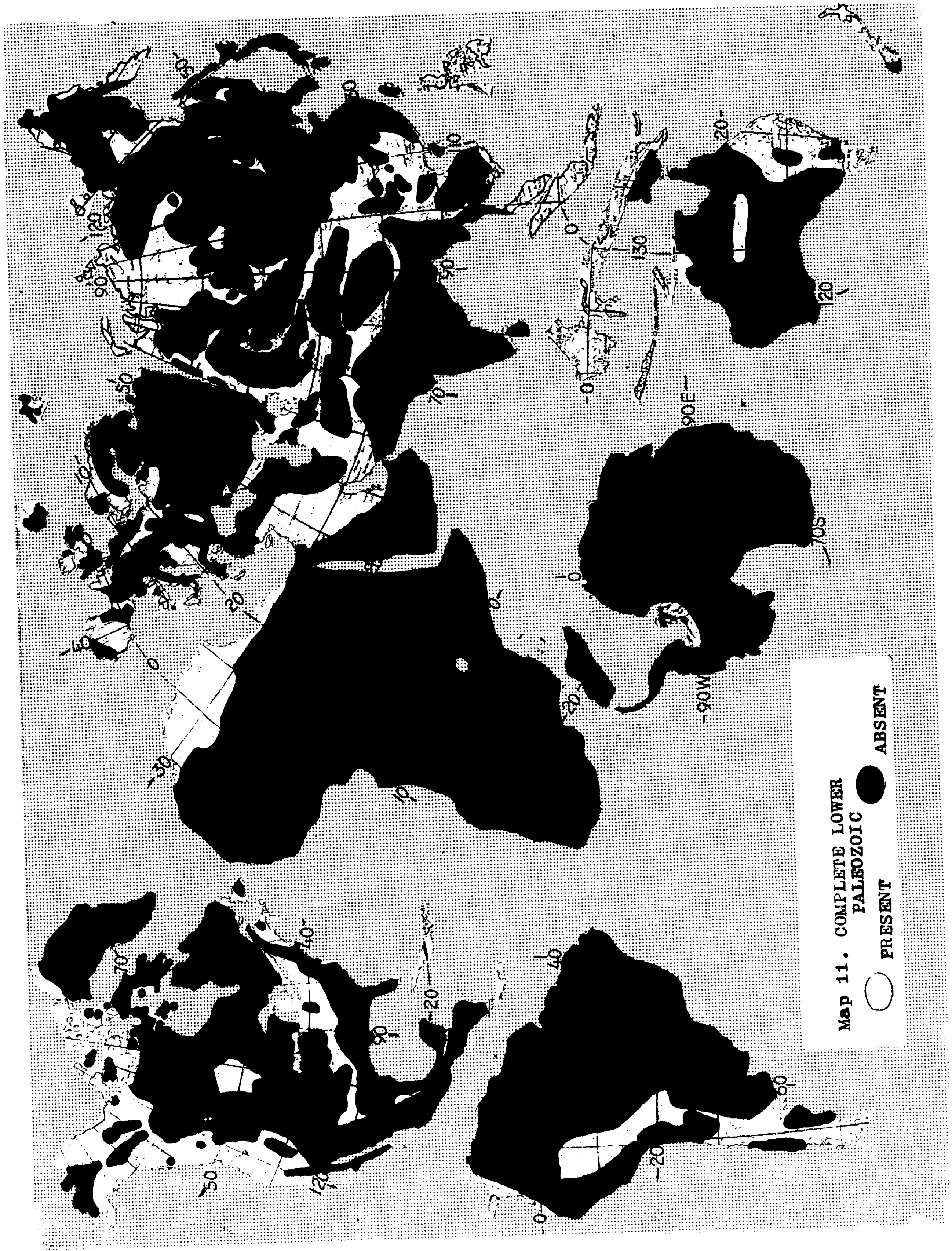

Map 6. PERMIAN
PRESENT
ABSENT

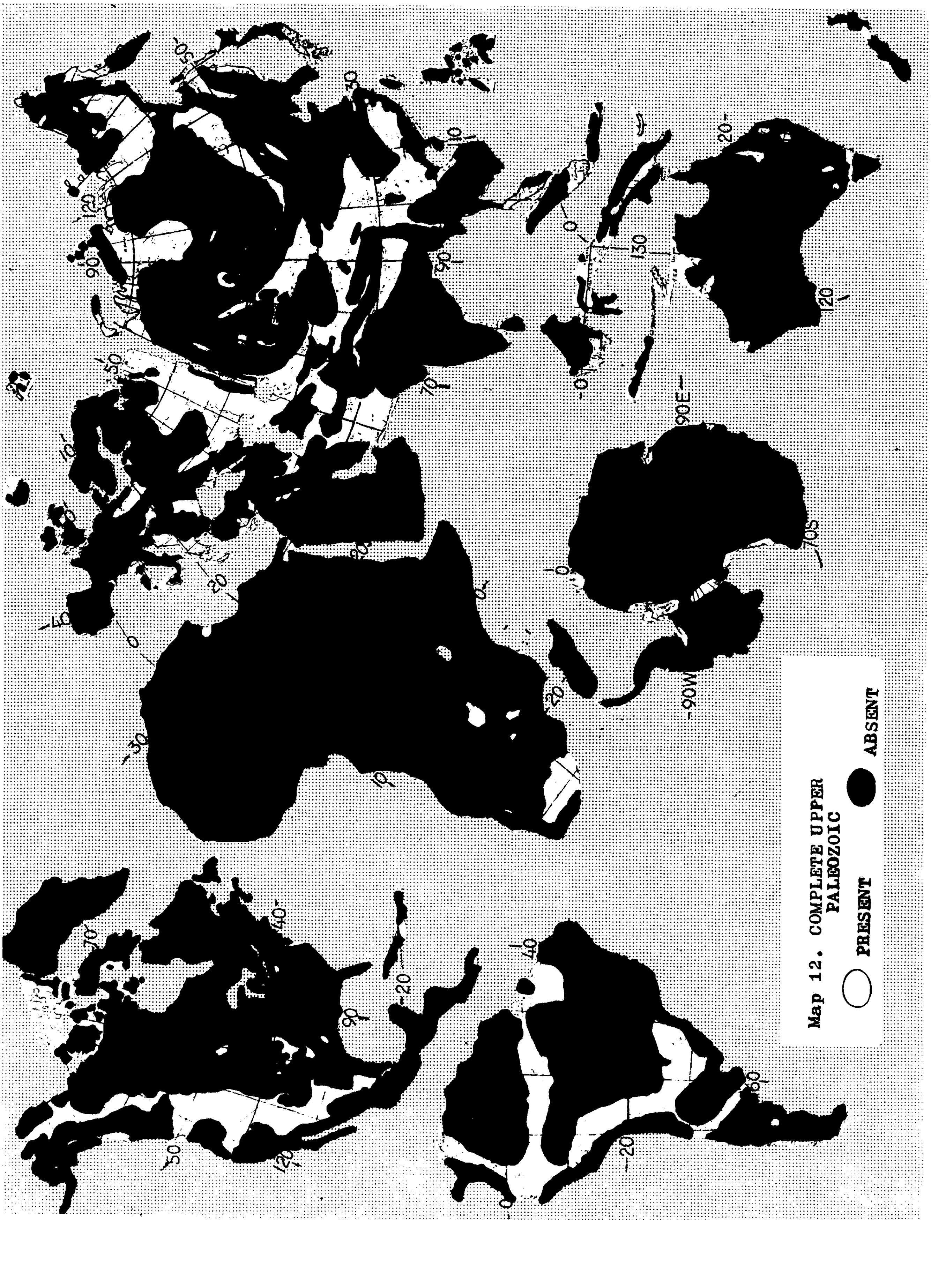

Map 7. TRIASSIC
PRESENT
ABSENT

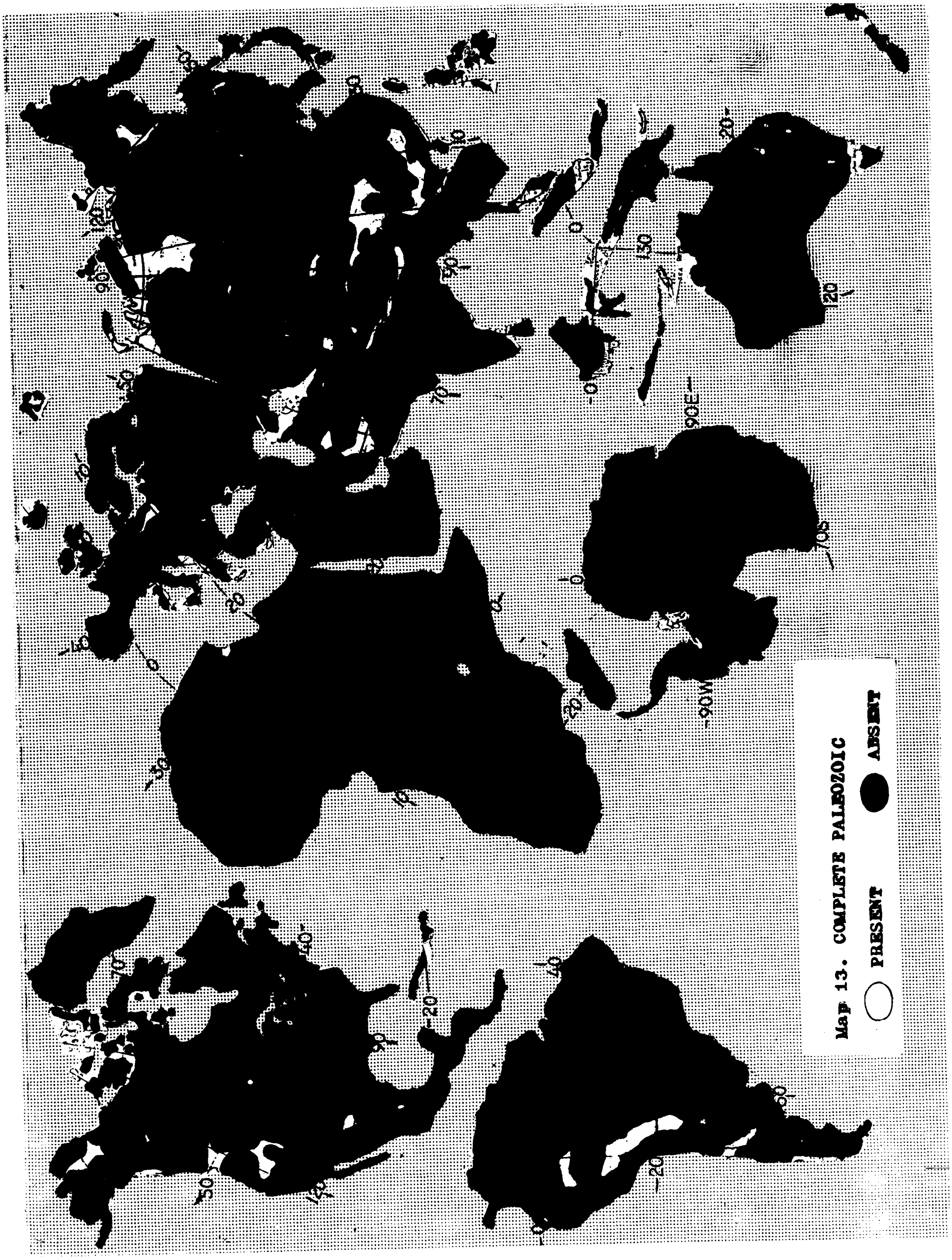

Map 8. JURASSIC
PRESENT
ABSENT

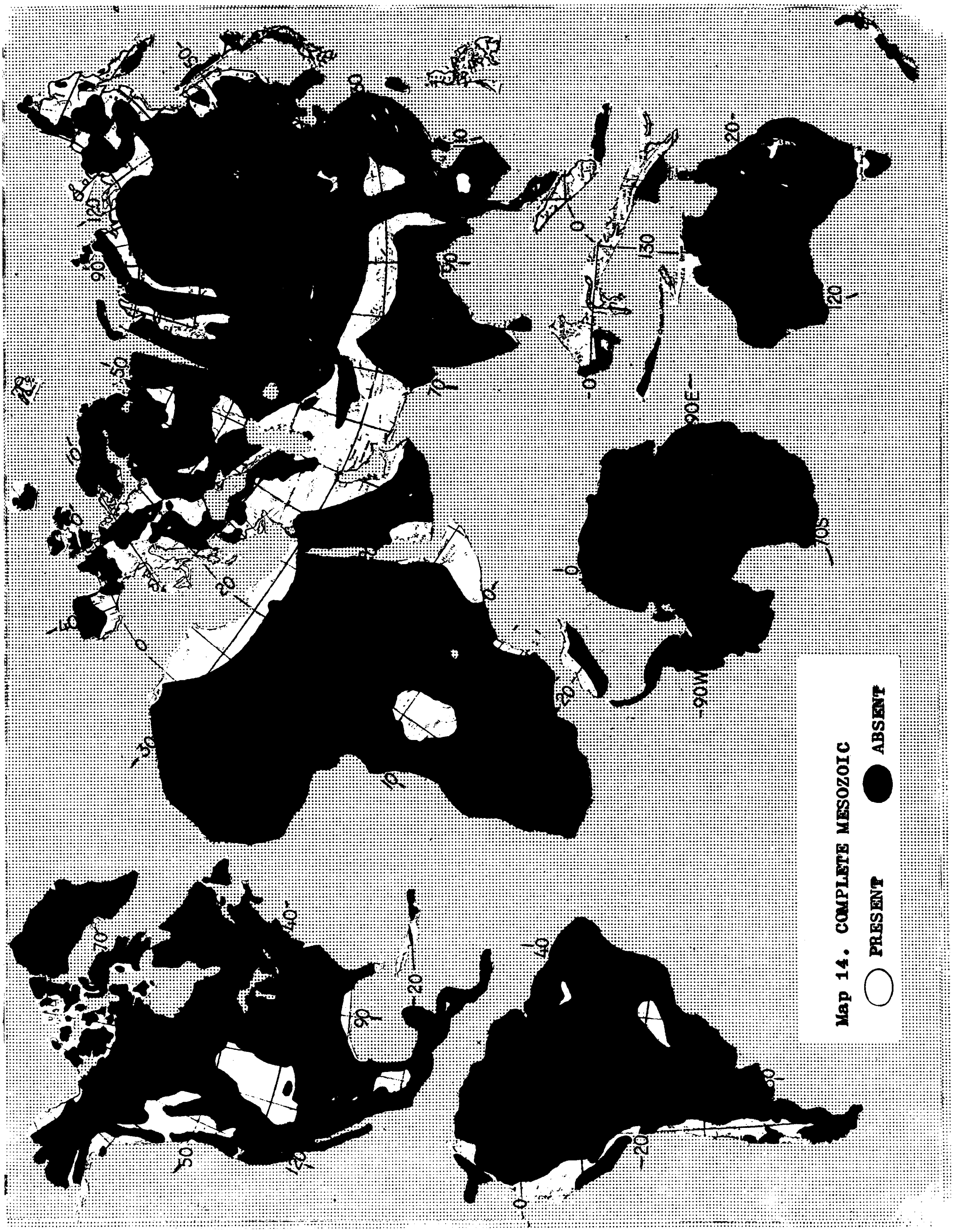

Map 9. CRETACEOUS
PRESENT
ABSENT

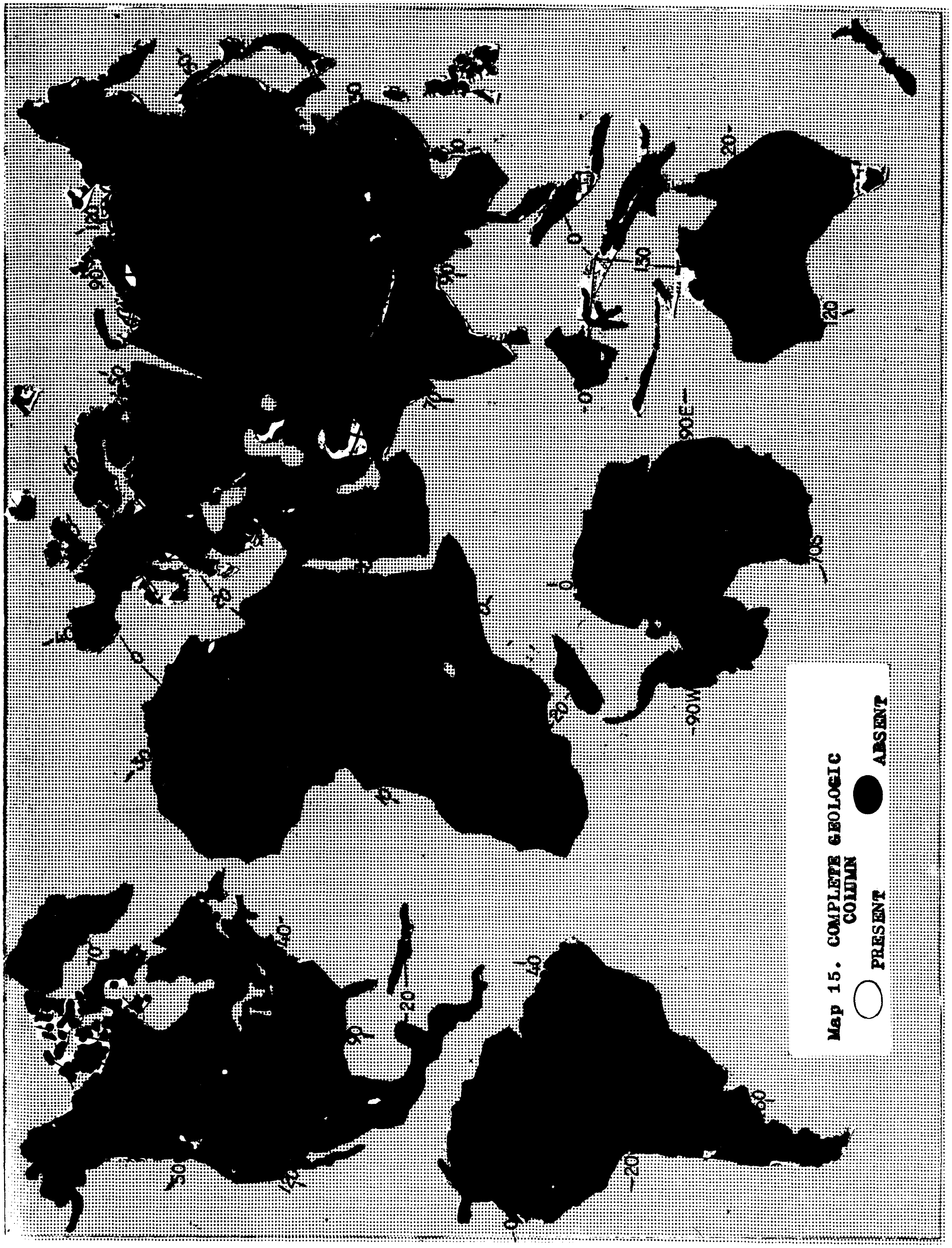

Map 10. TERTIARY
PRESENT
ABSENT


Map 11. COMPLETE LOWER PALEOZOIC
PRESENT
ABSENT

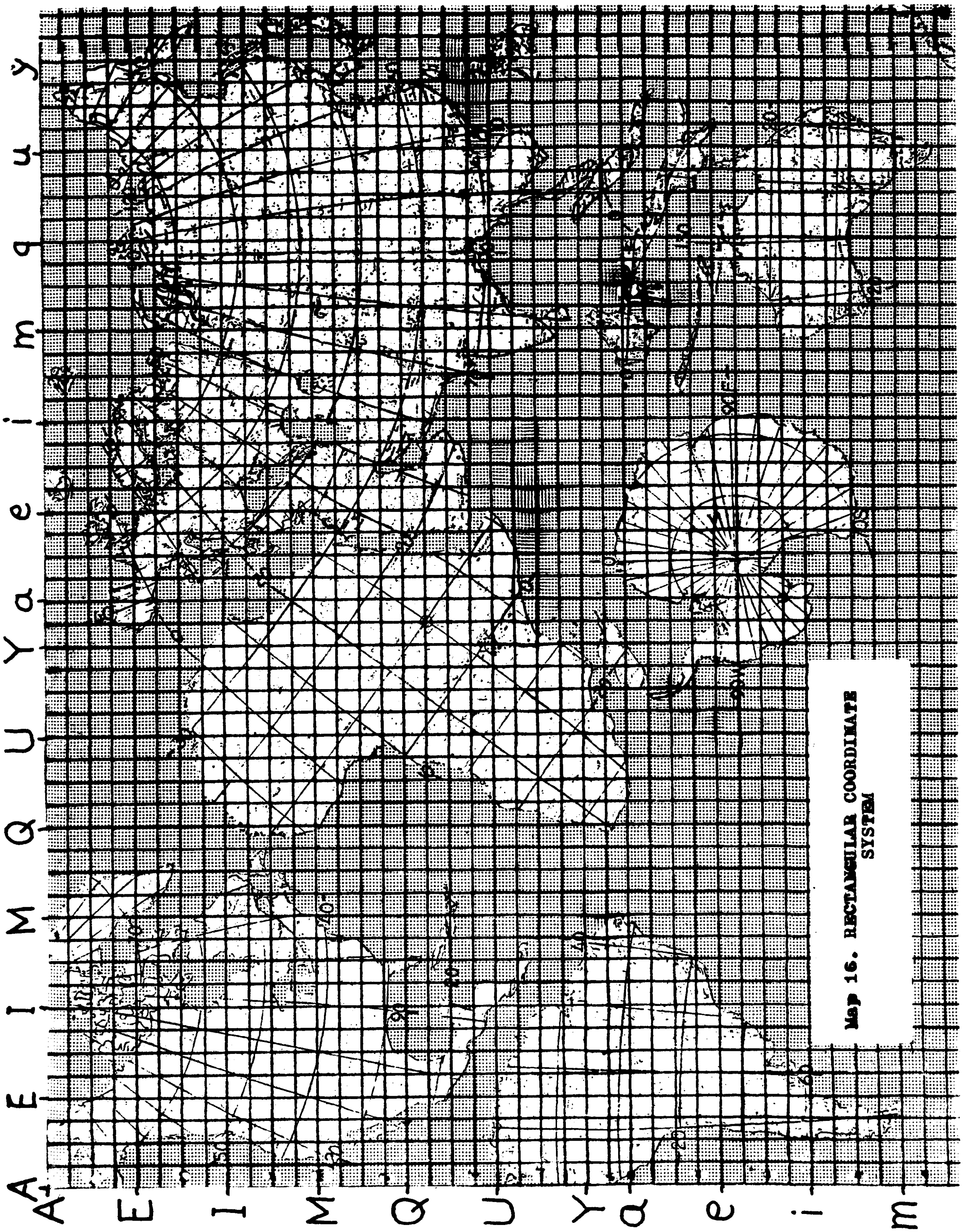

Map 12. COMPLETE UPPER
PALEOZOIC
PRESENT
ABSENT


Map 13. COMPLETE PALEOZOIC
PRESENT
ABSENT


Map 14. COMPLETE MESOZOIC
PRESENT
ABSENT
90E
90W
70S



Map 15. COMPLETE GEOLOGIC COLUMN



Map 16. RECTANGULAR COORDINATE SYSTEM

Coor.	COSDCPTJCT#
Africa	
(S,H)	0XXXX000XX6
(T,H)	XXXX0000X05
(U,H)	XXXXX000XX7
(V,H)	XXXXXX0X007
(W,H)	XXXX00XXXX8
(R,I)	0XX0X000X04
(S,I)	0XX0X000003
(T,I)	00X0X000002
(U,I)	XXXXX000005
(V,I)	XXXXX000005
(W,I)	XXXXX00XX07
(X,I)	XXXXX0XXXX9
(Y,I)	XXXXX0XXXX9
(Q,J)	0XX00000XX4
(R,J)	00X00000001
(S,J)	0XXXX000004
(T,J)	0XXXX000004
(U,J)	0XXXX000004
(V,J)	XXXXX00XX07
(W,J)	XXXXX00XX07
(X,J)	XXXXX0XXXX9
(Y,J)	XXXXX0XXXX9
(P,K)	00XX00000X3
(Q,K)	00XX0000002
(R,K)	0XXX0000003
(S,K)	0XXX00000X4
(T,K)	0XXXX0000X5
(U,K)	0XXXX00XX06
(V,K)	00XXX000X04
(W,K)	0XXXX000004
(X,K)	0XXXX0XXXX8
(Y,K)	XXXXX0XXXX9
(P,L)	000000000X1
(Q,L)	00000000000
(R,L)	00000000000
(S,L)	00000000000
(T,L)	00X000000X2
(U,L)	0XX0X00XXX6
(V,L)	0XX0X000X04
(W,L)	0X)XX000003
(X,L)	0XXXX00X005
(Y,L)	0XXXX0XXXX8
(Z,L)	0XX0X0XXXX7
(Q,M)	00000000000
(R,M)	00000000000
(S,M)	00000000000
(T,M)	00X0000XXX4
(U,M)	00X0000XXX4
(V,M)	000X000XX03
(W,M)	00XX000XX04
(X,M)	0XXX000XX05
(Y,M)	0XXXX00X0X6
(Z,M)	0XX0X00XXX6
(a,M)	0X00X0XXXX6
(b,M)	XXX0X0XXXX8
(R,N)	00000000000
(S,N)	00X00000001
(T,N)	00000000XX2
(U,N)	00000000XX2
(V,N)	0000000XX02
(W,N)	000X000XX03
(X,N)	0XXX00000X4
(Y,N)	0XX0000X003
(Z,N)	0XX0X00XXX6
(a,N)	0XX0X00XXX6
(b,N)	0000X0XXXX5
(c,N)	XX0XX0XXXX8
(S,O)	00000000XX2
(T,O)	00000000XX2
(U,O)	00000000X01
(V,O)	00000000XX2
(W,O)	00000000X01
(X,O)	000X0000XX3
(Y,O)	0X000000001
(Z,O)	0X00X00XX04
(a,O)	0X00X00XXX5
(b,O)	0000000XXX3
(T,P)	00000000XX2
(U,P)	00000000X01
(V,P)	00000000X01
(W,P)	00000000X01
(X,P)	000000000X1
(Y,P)	0000000X001
(Z,P)	0000X00XX03
(a,P)	0000X00XX03
(b,P)	00000000X01
(T,Q)	00000000X01
(U,Q)	00000000000
(V,Q)	00000000X01
(W,Q)	000000000X1
(X,Q)	00000000000
(Y,Q)	000000000X1
(Z,Q)	0000000XX02
(a,Q)	0000000XX02
(b,Q)	00000000X01
(S,R)	000X0000X02
(T,R)	00000000000
(U,R)	000000X0X02
(V,R)	000000X0X02
(W,R)	00000000000
(X,R)	00000000X01
(Y,R)	00000000000
(Z,R)	000000000X1
(a,R)	0000000X001
(b,R)	000000X0XX3
(S,S)	00000000XX2
(T,S)	000000000X1
(U,S)	000000XXX03
(V,S)	000000XXX03
(W,S)	000000X0X02
(X,S)	00000000000
(Y,S)	00000000000
(Z,S)	000000000X1
(a,S)	000000X0001
(b,S)	000000XX0X3
(S,T)	000000000X1
(T,T)	000000X0XX3
(U,T)	000000XXX03
(V,T)	000000XXX03
(W,T)	00000X00X02
(X,T)	0000XX00002
(Y,T)	00000000000
(Z,T)	000000X00X2
(a,T)	000000XX0X3
(b,T)	000000XX0X3
(R,U)	00000000XX2
(S,U)	000000X0001
(T,U)	000000X0X02
(U,U)	0000X0XXXX5
(V,U)	0000XXXXX05
(W,U)	0000XX00002
(X,U)	00000000000
(Y,U)	000000000X1
(Z,U)	000000XX0X3
(a,U)	000000XX002
(b,U)	000000XX002
(c,U)	000000XXXX4
(d,U)	000000XXXX4
(Q,V)	0000X000001
(R,V)	000XX000002
(S,V)	000000X00X2
(T,V)	0000X0X0XX4
(U,V)	0000X0X00X3
(V,V)	0000XX00002
(W,V)	00000000000
(X,V)	00000000000
(Y,V)	0000000X0X2
(Z,V)	0000000X0X2
(a,V)	000000XXXX4
(b,V)	000000XXXX4
(c,V)	000000XXXX4
(Q,W)	0000X000001
(R,W)	000XX0000X3
(S,W)	000X00000X2
(T,W)	000X00000X2
(U,W)	000XXX00003
(V,W)	0000X000001
(W,W)	00000000X01
(X,W)	0000X000001
(Y,W)	0000XX0XXX5
(Q,X)	X000X000001
(R,X)	000XX000002
(S,X)	000X00000X2
(T,X)	000X00X00X3
(U,X)	000X0XX0003
(V,X)	0000XXX0003
(W,X)	00000XX0002
(X,X)	0000XXXX0X5
(Q,Y)	X000X000002
(R,Y)	000XX0000X3
(S,Y)	000XX0X00X4
(T,Y)	000X0XX0003
(U,Y)	00000XX0002
(V,Y)	000X0XX0003
(W,Y)	00000000000
(X,Y)	0000000X001
(Q,Z)	000XXX00003
(R,Z)	000XXX00003
(S,Z)	000XXXX0004
(T,Z)	000XXXX0004
(U,Z)	000X00X0XX4
(Q,a)	00000XX0X03
(R,a)	000XXXX0004
(S,a)	000XXXX0X05
(T,a)	000XXXX0XX6
(W,a)	00000XXXXX5
(X,a)	0000X0X0X03
(Y,a)	000XX000002
North America	
(C,B)	XXX0XXX0006
(J,B)	XXXX0000004
(K,B)	X0X00000002
(L,B)	00000000000
(A,C)	00X0XX00X04
(B,C)	000X0X00X03
(C,C)	XXXXXXX0007
(D,C)	XXX0XXXXXX9
(H,C)	XXXXXXXXX09
(I,C)	XXXXX0X0X07
(J,C)	XXX00000003
(K,C)	00000000000
(L,C)	00000000000
(M,C)	00000000000
(N,C)	0X0X00XX004
(A,D)	XXXX0XXXX08
(B,D)	XXXX00XXX07
(C,D)	XXXXXX000X7
(D,D)	XXX0XXX0006
(F,D)	XXX00000XX5
(G,D)	XX0X0X00X05
(H,D)	XXXXXX00X07
(I,D)	XXX00000X04
(L,D)	00000000000
(M,D)	00000000000
(N,D)	00000000000
(C,E)	X0X0XX0XX06
(D,E)	XX0XX0X0X06
(E,E)	XXXX00X0X06
(F,E)	XXX00000X04
(G,E)	XXX00000003
(H,E)	XXXX0000004
(I,E)	XXX00000003
(J,E)	0X000000001
(M,E)	00000000000
(N,E)	00000000000
(C,F)	XXX0XXXXX08
(D,F)	X0XXX0X0005
(E,F)	XXXX0000X05
(F,F)	00X00000X02
(G,F)	00000000000
(H,F)	00000000000
(I,F)	00000000000
(K,F)	00X00000001
(M,F)	00000000000
(N,F)	00000000000
(C,G)	XXX0XXXX007
(D,G)	X0XXXXXX007
(E,G)	000X0000X02
(F,G)	00X00000X02
(G,G)	00000000000
(H,G)	00000000000
(I,G)	0X000000001
(K,G)	00000000000
(C,H)	XXX00XXXX07
(D,H)	X0XXXXXXX08
(E,H)	X00XX0X0X05
(F,H)	X0000000X02
(G,H)	00000000000
(H,H)	00000000000
(K,H)	00000000000
(L,H)	00000000000
(C,I)	XXXXXXXX0X9
(D,I)	XXX0XXXX007
(E,I)	X0XX0000X04
(F,I)	X00X0000X03
(G,I)	00X00000001
(H,I)	00X00000001
(K,I)	00000000000
(L,I)	00000000000
(M,I)	00000000000
(C,J)	XXXXXXXXXX10
(D,J)	X0XXXX0X006
(E,J)	XX0XX000X05
(F,J)	XX0X000XX05
(G,J)	XXXX0000X05
(H,J)	00000000000
(I,J)	0X000000001
(J,J)	0XX00000002
(K,J)	00000000000
(L,J)	00000000000
(M,J)	00000000000
(N,J)	X0XX0000003

Table 1. This table is a compilation of raw data used for all of the calculations in this article. As shown in Map 16, the earth's land surface was divided into 967 equal areas; each such square having a coordinate which can be found in Map 16 and in this table. (Here in the columns under "Coor.") Maps 1 through 10 were scanned for the same 967 coordinated areas to provide the data which comprise this table. The letters "C, O, S, D,. . ., etc.," indicate the geological periods: Cambrian, Ordovocian, Silurian, Devonian, Carboniferous, Permian, Triassic, Jurassic, Cretaceous, and Tertiary. "X"'s indicate the preponderant presence of the represented geological periods in a given square; "O"'s their absence. Under "#" is listed the number of periods present.

Coor.	COSDCPTJCT#
(B,K)	XXXX000XXX7
(C,K)	XXX0X0XXXX8
(D,K)	X0XXXX00005
(E,K)	XX0XX00XX06
(F,K)	XXXXX0XXXX9
(G,K)	XX0XX0XXX07
(H,K)	00000000000
(I,K)	00000000000
(J,K)	00000000000
(K,K)	0X000000001
(L,K)	0X0XX000003
(M,K)	XXXXX000005
(B,L)	XXX0XX0XXX8
(C,L)	XXXXXXX0007
(D,L)	XX0XXXXX007
(E,L)	XX00XXXXXX8
(F,L)	0000XXXXXX6
(G,L)	X0000000X02
(H,L)	00000000000
(I,L)	00000000000
(J,L)	0XX00000002
(K,L)	0XX00000002
(L,L)	XX0X0000003
(M,L)	XXXXX000005
(B,M)	0XX0000XXX5
(C,M)	0XXXXXX00X7
(D,M)	000XXXXXXX7
(E,M)	0000XXXXXX6
(F,M)	0X00XXXXXX7
(G,M)	0XX0X000X04
(H,M)	0X0XX000003
(I,M)	0XXX0000003
(J,M)	0XXX0000003
(K,M)	0XXX0000003
(L,M)	0X0X0000002
(B,N)	X0X000X0X04
(C,N)	X00XXXX00X6
(D,N)	000XXXX0X05
(E,N)	0000X0X0XX4
(F,N)	XX00XX00XX6
(G,N)	X00XXX00004
(H,N)	XX0X0000003
(I,N)	XXXXX000005
(J,N)	XXXXX000005
(K,N)	X00X00X0003
(C,O)	X00X0X00003
(D,O)	XX0XXX00XX7
(E,O)	0XX0XXX0XX7
(F,O)	XX00XX00X05
(G,O)	XXX0X000X05
(H,O)	XX000000XX4
(I,O)	XX0XX000X05
(J,O)	XX0X0000003
(K,O)	00000000XX2
(C,P)	00XX0000002
(D,P)	XX0XXX00XX7
(E,P)	XX0XXXX0XX8
(F,P)	XX0XX000X05
(G,P)	XX0XX00XXX7
(H,P)	XX0X00XXXX7
(I,P)	0X0X000XXX5
(J,P)	00X00000XX3
(D,Q)	000X00000X2
(E,Q)	XXXXXX0XXX9
(F,Q)	0000000XXX3

Coor.	COSDCPTJCT#
(D,R)	00000000XX2
(E,R)	X0XXX0XXXX8
(E,S)	00X000X0X03
(F,S)	XX00XX0XXX7
(H,S)	0000XX0XXX5
(L,S)	XXXX0XXXXX9
(E,T)	00X0000XX03
(F,T)	0000000XX02
(G,T)	X000XX0XXX6
(H,T)	XX00XX0XXX7
(H,U)	00000000XX2
(I,U)	000000X0X02
(I,V)	XXX0000XX05

South America

Coor.	COSDCPTJCT#
(A,V)	XXX000X0XX6
(B,V)	XX0XXX00XX7
(C,V)	00000000XX2
(D,V)	00000000XX2
(E,V)	00000000XX2
(F,V)	000000X0X02
(A,W)	X000XXX0XX6
(B,W)	X00XXXX0XX7
(C,W)	000000X00X2
(D,W)	000000X0001
(E,W)	000000XX002
(F,W)	000000XX002
(G,W)	00000000000
(H,W)	000000000X1
(A,X)	XX0XXXX XX8
(B,X)	XX0000X0XX5
(C,X)	000000X0001
(D,X)	000000X0001
(E,X)	00000000000
(F,X)	000X0000001
(G,X)	0X0X0000002
(H,X)	000000000X1
(A,Y)	XX0XXXXXXX9
(B,Y)	XXXXX0X0XX8
(C,Y)	0XXXX0000X5
(D,Y)	00XXX0000X4
(E,Y)	00XXX000003
(F,Y)	00XXXX000X5
(G,Y)	0XXXXX000X6
(H,Y)	000XXXX00X5
(I,Y)	00XXXXX0XX7
(J,Y)	00XXXXX0XX7
(A,Z)	XX0XXXXXXX9
(B,Z)	XXXXXX00XX8
(C,Z)	XXX0XX00XX7
(D,Z)	000XXX000X4
(E,Z)	000XXX000X4
(F,Z)	000XXX00XX5
(G,Z)	00000000000
(H,Z)	00000000000
(I,Z)	0XXXXXXXX08
(J,Z)	00XXXXX0XX7
(K,Z)	00000000X01
(A,a)	XX0000XXX05
(B,a)	XXX0XX00XX7
(C,a)	XXX0XX00XX7
(D,a)	0000X000XX3
(E,a)	000X0000001

Coor.	COSDCPTJCT#
(F,a)	000X0000001
(G,a)	000000000X1
(H,a)	000000000X1
(I,a)	00X0XXX0X05
(J,a)	00X00XX0003
(K,a)	00000000X01
(L,a)	00000000XX2
(B,b)	XX0XXXXXXX9
(C,b)	XXXXXX00XX8
(D,b)	XXXXX000XX7
(E,b)	00000000000
(F,b)	000X00X0002
(G,b)	000000000X1
(H,b)	000000000X1
(I,b)	00X00000X02
(J,b)	00000000X01
(K,b)	000000X0X02
(A,c)	X00000000X2
(B,c)	X0000X000X3
(C,c)	0XXX0X0XXX7
(D,c)	0XXXXX00XX7
(E,c)	0XX00000002
(F,c)	00XX0000002
(G,c)	000X0X00X03
(H,c)	000000X0X02
(I,c)	00XX00X0X04
(J,c)	00000000X01
(K,c)	00000000XX2
(C,d)	XX00000XXX5
(D,d)	XXXXXXX0X08
(E,d)	XXXX0X000X6
(F,d)	00XX0000002
(G,d)	000X0XX0X04
(H,d)	000X0XXXX05
(I,d)	00000XX0X03
(J,d)	00000000X01
(C,e)	XX00000XXX5
(D,e)	XX0XXXX0XX8
(E,e)	0XXXXXX00X7
(F,e)	00XX0X00003
(G,e)	000XXXX0X05
(H,e)	000XXX00003
(I,e)	00000000000
(C,f)	XX00XX0XXX7
(D,f)	XXX0XX00XX7
(E,f)	0XXXXX000X6
(F,f)	000XXX00XX5
(G,f)	000XXX00X04
(H,f)	0000XXX0X04
(C,g)	XXXXXXXXXX10
(D,g)	XXX0XX00XX7
(E,g)	00000XX00X3
(F,g)	000XXXX0X05
(G,g)	00000X00X02
(C,h)	XXX0X0XXXX8
(D,h)	XXXXXX00XX8
(E,h)	00000X00XX3
(F,h)	00000000XX2
(C,i)	XXX000XXXX7
(D,i)	XXX00000XX5
(E,i)	XXXX0000XX6
(C,j)	XXX00XXXXX8
(D,j)	XX0XX000XX6
(C,k)	XXX000X0XX6
(D,k)	XX00XX00XX6

Coor.	COSDCPTJCT#
(C,l)	XXXX000XX06
(C,m)	XXX0000XX05

Antarctica

Coor.	COSDCPTJCT#
(b,a)	0000XX00002
(c,a)	0000XX00002
(a,b)	0000XX00002
(b,b)	00000000000
(c,b)	00000000000
(d,b)	0000XX00002
(e,b)	0000XX00002
(f,b)	0000XX00002
(a,c)	0000000X001
(b,c)	00000000000
(c,c)	00000000000
(d,c)	00000000000
(e,c)	00000000000
(f,c)	00000000000
(g,c)	0000XX00002
(w,d)	0000X000XX3
(x,d)	0000X000XX3
(a,d)	X00XXX0X005
(b,d)	00000000000
(c,d)	00000000000
(d,d)	00000000000
(e,d)	00000000000
(f,d)	00000000000
(g,d)	000XX000002
(x,e)	X000X00XXX5
(y,e)	X000X00XXX5
(z,e)	XXXXX00X006
(a,e)	0000X00X002
(b,e)	00000000000
(c,e)	00000000000
(d,e)	00000000000
(e,e)	00000000000
(f,e)	00000000000
(g,e)	00000000000
(x,f)	X000X00X0X4
(y,f)	XXXXXX0X007
(z,f)	XXX0XX00005
(a,f)	X000XX0X004
(b,f)	00000000000
(c,f)	00000000000
(d,f)	00000000000
(e,f)	00000000000
(f,f)	00000000000
(g,f)	00000000000
(h,f)	00000000000
(X,g)	X000XX0X0X5
(Y,g)	X000XX0XX05
(Z,g)	X000XX00003
(a,g)	X00XXX00004
(b,g)	X000XX0X004
(c,g)	00000000000
(d,g)	00000000000
(e,g)	00000000000
(f,g)	00000000000
(g,g)	00000000000
(h,g)	000X0000001
(Y,h)	X000XX0XXX6
(Z,h)	X000XX0XXX6

Coor.	COSDCPTJCT#
(a,h)	X000XX00003
(b,h)	X00X0XXX0X6
(c,h)	X00XXX0X005
(d,h)	00000000000
(e,h)	00000000000
(f,h)	00000000XX2
(g,h)	00000000XX2
(h,h)	00000000000
(Y,i)	X000XX0X0X5
(Z,i)	X000XX0X0X5
(a,i)	X000XX0X0X5
(d,i)	X00XXX00XX6
(e,i)	00000000000
(f,i)	00000000XX2
(g,i)	00000000XX2
(h,i)	00000000XX2
(d,j)	X000X00X003
(e,j)	00000000XX2
(f,j)	00000000000
(g,j)	00000000000
(d,k)	X000X0XX004
(e,k)	X00X0XX0XX6
(f,k)	00000000000
(g,k)	00000000000

Australia

Coor.	COSDCPTJCT#
(q,f)	X0000000X02
(o,g)	XX0XXX00005
(p,g)	XXX00000003
(q,g)	X0X00000X03
(r,g)	X0000000X02
(l,i)	0X00XX00XX5
(m,i)	00000000000
(n,i)	00000000000
(o,i)	00000X00X02
(p,i)	X0000X00002
(q,i)	XX000000002
(r,i)	XX0X0000X04
(s,i)	X00X000XX04
(t,i)	X00X00XXX05
(u,i)	XXXXXXXX0X9
(m,j)	00000X00X02
(n,j)	00000000000
(o,j)	00000000X01
(p,j)	X0000X00X03
(q,j)	XX000000X03
(r,j)	XX00000XX04
(s,j)	XX000000X03
(t,j)	XXX0000XX05
(u,j)	XXX000XXX06
(v,j)	XXXXX00X006
(m.k)	00000000000
(n,k)	00000000000
(o,k)	000000000X1
(p.k)	00000000XX2
(q,k)	00000X00001
(r,k)	X0000000001
(s,k)	XXX00000X04
(t,k)	XX0X0000X04
(u,k)	XXX000X0X05
(v,k)	XXXXX000005
(n,l)	000000000X1
(r,l)	X0000000001
(s,l)	X00000000X2

Coor.	COSDCPTJCT#
(t,l)	XXX0XX000X6
(u,l)	XXX00000003
(s,m)	0000XX000X3
(t,m)	XXXX0X00005
(u,m)	XXXXX000005
(t,n)	XXXX0X00005

Eurasia

Coor.	COSDCPTJCT#
(f,B)	000000000X1
(j,B)	XX00XXXXXX8
(v,C)	XXX0XXXX007
(w,C)	0X0000XXXX5
(c,D)	XXXX0000004
(d,D)	XXX0XX0XX07
(e,D)	XX0X0000003
(v,D)	X0X0XXXX006
(w,D)	0X0X00XXXX6
(x,D)	0XXXXXXXXX9
(Z,E)	XX000000002
(a,E)	XXXXX0XXXX9
(c,E)	XX0XX00XX06
(f,E)	XX000000002
(g,E)	XXX00000003
(h,E)	XX000000002
(i,E)	X0000000001
(p,E)	XXX00000003
(u,E)	X000X0XX0X5
(v,E)	X00XXXXX006
(w,E)	0X0X0XXX005
(X,E)	0XXXXXXXXX9
(Z,F)	XXXXX00XXX8
(a,F)	0XXXX0XXXX8
(b,F)	0XX00000XX4
(c,F)	0XXXX0XXXX8
(d,F)	XX0XX0XX006
(e,F)	X0X00XXXXX7
(f,F)	XXX00000003
(g,F)	XX000000002
(h,F)	00000000000
(i,F)	00000000000
(j,F)	000X0000001
(m,F)	XXXXXX0XX08
(p,F)	XXXX000X005
(q,F)	XXXXXXXXX09
(r,F)	X0X0XXXXXX8
(s,F)	X0XXXXXXXX9
(t,F)	XXXXXXXXX09
(u,F)	0X0XX0XX0X6
(v,F)	XX0XXXXXXX9
(w,F)	0XXXXXXXX08
(x,F)	0XXX0XXXXX8
(c,G)	0XXXX0XXXX8
(d,G)	000000X0001
(e,G)	XXXXXXXXXX10
(f,G)	XXXXX0XXXX9
(g,G)	XXXX0000004
(h,G)	00000000000
(i,G)	00000000000
(j,G)	X000XX0X004
(k,G)	0X0XXX0XX06
(m,G)	XXXXXX00XX8

Coor.	COSDCPTJCT#
(n,G)	XXXXXXXXXX10
(o,G)	XXXXXX0XXX9
(p,G)	XXXXXXXXX09
(q,G)	X0XXXXX0005
(r,G)	X0000000001
(s,G)	X00X000X0X4
(t,G)	X00XXXXXX07
(u,G)	X00XXXXX006
(v,G)	0X0XXXXX006
(w,G)	0X0XX0XXXX7
(y,G)	XX0X00XX0X6
(c,H)	0XXXXXXXXX9
(d,H)	XXXXX0X0XX8
(e,H)	000XX0XX0X5
(f,H)	XXXX000XXX7
(g,H)	X0XX000X004
(h,H)	XX0XX00XX06
(i,H)	XX0XXX0XX07
(j,H)	X000XXXXX06
(k,H)	0X0XXX0XX06
(l,H)	XXXXX000XX7
(m,H)	XXXXX0XXXX9
(n,H)	XXX0X00XXX7
(o,H)	XXXXX00XXX8
(p,H)	XXXXXXX0007
(q,H)	XXXXXX00006
(r,H)	XXX00X00004
(s,H)	XX00000X0X4
(t,H)	X00000XX0X4
(u,H)	X00X0XXX0X6
(v,H)	X0X00X00003
(c,I)	0X0XXXXXXX8
(d,I)	XXXXX00XXX8
(e,I)	000XXXXXXX7
(f,I)	00X00000XX3
(g,I)	000X000XXX4
(h,I)	X00XX00XX05
(i,I)	X00XXX0XX06
(j,I)	000XXX0X004
(k,I)	0X0XXX00004
(l,I)	XX0XX000XX6
(m,I)	00X000XXXX5
(n,I)	0000X00XXX4
(o,I)	XXXXX00XXX8
(p,I)	XXXXXXX0007
(q,I)	XXXXXXX0007
(r,I)	X0X0XXX0005
(s,I)	XXX0000X004
(t,I)	XXX00000003
(u,I)	00000000000
(v,I)	X0XX0X00004
(c,J)	0XXXXXXXX08
(d,J)	000X0000XX3
(e,J)	X0XXXXXXXX9
(f,J)	00X00000XX3
(g,J)	000XXXXXXX7
(h,J)	000XX00XXX5
(i,J)	000XXX0XXX6
(j,J)	000XXX0XX05
(k,J)	000XX000002
(l,J)	XXXXX000XX7
(m,J)	XXX000XXXX7
(n,J)	000X000XXX4
(o,J)	XX0XX00XXX7
(p,J)	XXX00X00004

Coor.	COSDCPTJCT#
(q,J)	XXX00X000X5
(r,J)	XX000X00003
(s,J)	XX00X000003
(t,J)	X000X000002
(u,J)	X00XX000003
(v,J)	XX0X0XX0005
(w,J)	X0000XXXX05
(x,J)	0XXX0XXXXX8
(d,K)	0000XXXXXX6
(e,K)	XX0XXX0XXX8
(f,K)	X0XXXX0XXX8
(g,K)	000XXX00XX5
(h,K)	000XXXXXXX7
(i,K)	000XXXXXXX7
(j,K)	000XXX0XXX6
(k,K)	XXXXX0000X6
(l,K)	XXXX0000XX6
(m,K)	XX0XX00XXX7
(n,K)	X0XXX00XXX7
(o,K)	XXXXXX0XX08
(p,K)	X0XX000X004
(q,K)	XX0X0X0X005
(r,K)	XXX00X00004
(s,K)	00000000000
(t,K)	X00X00X0003
(u,K)	X00XXX0X005
(v,K)	XXX0XX0XXX8
(w,K)	000XXXXXXX7
(x,K)	XXX000XXX06
(y,K)	0XXXXXX0X07
(d,L)	XX0XX0XXXX8
(e,L)	00000XXXXX5
(f,L)	X000XXXXXX7
(g,L)	X0XX0X0XXX7
(h,L)	X0XXXX0XXX8
(i,L)	X00XXX0XXX7
(j,L)	XX0XXX0XXX8
(k,L)	XXXXX000XX7
(l,L)	XX0XX0000X5
(m,L)	XX0XX0000X5
(n,L)	0X0XX0000X4
(o,L)	XXXXX0000X6
(p,L)	X00X0000002
(q,L)	X0000000001
(r,L)	X0000000001
(s,L)	00000000X01
(t,L)	000XXXXXX06
(u,L)	XX0XX00X005
(v,L)	0XX0X00X0X5
(w,L)	X0000X0XXX5
(x,L)	XXXX0XXXX08
(z,L)	0000XX0XXX5
(e,M)	XXX0X0XXXX8
(f,M)	X0X00XXXXX7
(g,M)	X00X000XXX5
(i,M)	XXXXXX0XXX9
(k,M)	XXXXX000XX7
(l,M)	XX0XX0000X5
(m,M)	X0XX0000003
(n,M)	X0XX00000X4
(o,M)	000XX0000X3
(p,M)	XXXX0000004
(q,M)	X0XXX000004
(r,M)	X00XX000003
(s,M)	X00XX000003

Coor.	COSDCPTJCT#
(t,M)	X00XX00XXX6
(u,M)	0X00XX00003
(v,M)	00X0XX000X4
(w,M)	00X00X000X3
(x,M)	00X00XX0X04
(z,M)	000XXX0XXX6
(d,N)	XXX000XXXX7
(e,N)	XXXXX0XXXX9
(f,N)	XXX0XXXXXX9
(g,N)	XX0XXXXX0X8
(i,N)	X0000XXXXX6
(j,N)	XXXXXX0XXX9
(k,N)	XXXXXX00XX8
(l,N)	0X0XX0000X4
(m,N)	XXXX0000004
(n,N)	X0XX0X000X5
(o,N)	000XXX0XXX6
(p,N)	0X)XXX))XX6
(q,N)	XX0XX0000X5
(r,N)	0X0XX000XX5
(s,N)	XX0XX000XX6
(t,N)	0XXXX000XX6
(u,N)	0000XX00X03
(v,N)	00X00X0XX04
(w,N)	XX00X00XX05
(x,N)	XX00X00XX05
(z,N)	0X00XX0X0X5
(d,0)	XX00000X003
(e,0)	XXXX0XXXXX9
(f,0)	XXX00XXXXX8
(g,0)	X00000XX0X4
(h,0)	XX0XX0XXXX8
(i,0)	XXXXX0XXXX9
(j,0)	XXX0XXXXXX9
(k,0)	XXXXXX0XXX9
(l,0)	XX0XXX0XXX8
(m,0)	XXXXXX0X0X8
(n,0)	X0X00X000X4
(o,0)	X0X0000X0X4
(p,0)	XXXXXX00006
(q,0)	X0XXXX00005
(r,0)	00XX0X000X4
(s,0)	00000000X01
(t,0)	X000X0XX0X5
(u,0)	XX00X0XXXX7
(v,0)	XX00X0XX0X6
(x,0)	XX000000002
(z,0)	000XXXXXXX7
(d,P)	0X0000000X2
(e,P)	XXXX0XXXXX9
(f,P)	XXXX0XXXXX9
(g,P)	XX0X0XXXXX8
(h,P)	XXXXXXXXXX10
(i,P)	X000XXXXXX7
(j,P)	X00XXXXXXX8
(k,P)	X0000XX0XX5
(l,P)	00XXXXXXXX8
(m,P)	X0XXXX0XXX8
(n,P)	000X0X00XX4
(o,P)	0X0XXX0XXX7
(R,P)	0X0XX00X05
(q,P)	0XXXXX0XX07
(r,P)	XXXXX0X0006
(s,P)	XXXXX0XXX08
(t,P)	XX00XXXXXX8

Coor.	COSDCPTJCT#
(u,P)	XX00XX000X5
(v,P)	XX00X0XX0X6
(d,Q)	0X00000X0X3
(e,Q)	0X000X0XXX5
(f,Q)	XXXX0XXXXX9
(g,Q)	XXXX0XXXXX9
(h,Q)	XXXXXXXXXX10
(i,Q)	XXXXXXXXXX10
(j,Q)	X0X00XXXXX7
(k,Q)	X0X00XXXXX7
(l,Q)	XXX0XXXXXX9
(m,Q)	XXX0XXXXXX9
(n,Q)	X00X000XXX5
(o,Q)	X00XXX0XX06
(p,Q)	X0XXXX00X06
(q,Q)	XXXXXX00X07
(r,Q)	XXXXXXX0007
(s,Q)	XXXXXXX0007
(t,Q)	XX0XXX00005
(u,Q)	X000XX000X4
(v,Q)	0000XX00002
(w,Q)	0XXXXX000X6
(d,R)	0000000X001
(e,R)	X0000X0XXX5
(f,R)	XXX00XXXXX8
(h,R)	XX0XXXXXXX9
(i,R)	X00XXXXXXX8
(j,R)	X000XXXXXX7
(k,R)	X000XXXXXX7
(l,R)	X00000000X2
(m,R)	XXX00XX00X6
(n,R)	XXX0XXXXXX9
(o,R)	X00XXXXXXX8
(p,R)	X00X0XXXX06
(q,R)	XXX00XXXXX8
(r,R)	XXXXXXX0X08
(s,R)	XXXXXXXX0X9
(t,R)	XXX0XXXXX08
(u,R)	XXX0X0XX0X7
(v,R)	0X0XXXX0X06
(w,R)	X00XXX00XX6
(d,S)	000000XXXX4
(e,S)	X0000X0XXX5
(f,S)	X0000X0XXX5
(g,S)	XX000XXXXX7
(h,S)	XX00XXXXXX8
(j,S)	X000XXXXXX7
(k,S)	0000XX0XXX5
(l,S)	00000000000
(m,S)	00000000000
(n,S)	X00000X00X3
(o,S)	XXXXXXX00X8
(p,S)	XXXXXXX0XX9
(q,S)	XXXXXXX00X8
(r,S)	XX0XXXXXX08
(s,S)	XX0XXXXX007
(t,S)	X0XXXXX0XX8
(u,S)	XX0XXXX0006
(v,S)	XXXXXXX0X08
(w.S)	000XX000X03
(x,S)	0000X000X02
(d,T)	000000XXXX4
(e,T)	X000000XXX4
(f,T)	X0000X0XXX5
(g,T)	XX000X0XXX6

Coor.	COSDCPTJCT*	Coor.	COSDCPTJCT#	Coor.	COSDCPTJCT#	Coor.	COSDCPTJCT#	Coor.	COSDCPTJCT#
(k,T)	0000000XXX3	(o,U)	00000000XX2	(m,W)	0000X00XXX4	(k,b)	XXXXXXXX008		
(l,T)	00000000XX2	(q,U)	0000000XXX3	(s,W)	X000XXXX005	(n,b)	XXXXX0XXXX9		
(m,T)	00000XX0002	(r,U)	XX00XXXX006	(t,W)	XX0XX0X0005	(u,b)	XXXXX0X0X07		
(n,T)	0000XX00002	(s,U)	0XXXX0X0005	(u,W)	XX00000X003	(r,c)	XXX0XXXXXX9	(m,h)	00000000000
(o,T)	000000000X1	(t,U)	XX0XX0X0005	(y,W)	XXXX00XXXX8	(s,d)	XXX0000XXX6	(n,h)	00000X00X02
(p,T)	000X0000XX3	(u,U)	XXX0000X0X5	(l,X)	00000000XX2	(t,d)	XXX0XXXXX08	(o,h)	XX000X0XX05
(q,T)	X000000XXX4	(x,U)	XXXX00X0XX7	(m,Y)	0000X000001	(s,e)	X00X0000XX4	(p,h)	XX0X0X00004
(r,T)	XX00XXXXX07	(l,V)	00000000000	(s,Y)	XXXXXXX0X08	(t,e)	X000000XXX4	(q,h)	X0000000001
(s,T)	XXXXXXX0007	(m,V)	0000000X001	(m,Z)	XXXX00XXXX8			(r,h)	XXXX0000004
(t,T)	XXXXXXXX008	(n,V)	00000000XX2	(r,Z)	XXXXX0XXX08			(s,h)	XX0X000XX05
(u,T)	XXXX00X00X6	(r,V)	X000XXX0004	(s,Z)	XXXXX0XXX08	New Zealand		(t,h)	000X0X0XX04
(v,T)	0X0X00XXXX6	(s,V)	0XX0XXXXX07	(l,a)	XXX000XXXX7			(u,h)	X0XXXX000X6
(l,U)	00000000XX2	(t,V)	000X00X0X03	(m,a)	XXXX00XXX07	(y,p)	XXX00XXX0X7		
(m,U)	0000XX00002	(y,V)	XXX00X0XXX7	(s,a)	XXXXXXXXXX10	(z,o)	XXX00X0X005		
(n,U)	00000000000	(l,W)	00000000000	(t,a)	XXXXXXXXXX10				

earth's land surface is hard-pressed to produce even 3 of the 10 geologic periods in "correct" consecutive order.

The quantitative data is particularly revealing. From Figure 1, it is evident that nearly 13% of the earth's land surface has 5 geologic periods represented (irrespective of their order or identity) while slightly less than 1% has all 10 periods simultaneously in place. From the cumulative frequency curve in Figure 1, it can be seen that 42% of earth's land surface has 3 or less geologic periods present at all; 66% has 5 or less of the 10 present; and only 14% has 8 or more geologic periods represented at all.

Individual geologic periods' coverage of the earth's land surface range from a high of just over 51% for Cretaceous (Fig. 2) to a low of only 33% for Triassic. Sequences of consecutive geologic periods cover far less area. Sequences of 3 consecutive geologic periods and their per cent terrestrial areal coverage are: complete Lower Paleozoic 21%, complete Upper Paleozoic 17%, complete Mesozoic 16%. For 6 consecutive geologic periods, one finds only 5.7% of the earth's land surface covered by complete Paleozoic, and only 4.0% covered by complete Upper Paleozoic/complete Mesozoic.

The overall failure of geologic periods to be numerically abundant in most places on earth and their even greater failure to occur in consecutive sequences is significant enough, but it can be seen from Table 2 that where geologic periods' rocks *do* exist they often fail to rest "properly." A significant percentage of every geologic period's rocks does not overlie rocks of the next older geologic period. In fact, only a *bare majority* of Cretaceous, Jurassic, and Devonian "properly" overlie the next older geologic period's rocks (Jurassic, Triassic, and Silurian, respectively). Some percentage of *every* geologic period rests directly upon Precambrian "basement," especially high percentages of Ordovician (23.2%) and Devonian (18.6%) doing so.

There apparently are regions on earth where all ten geologic periods can be found superposed (Map 15). Frank and Fuchs[81] presented stratigraphic correlation charts for Himalayan Geology in West Nepal. A complete geologic column was shown, but Cambrian and Ordovician were shown as uncertain. In the lower Himalayas, the Triassic was shown as unknown, and some slates were questionably placed in a range from Precambrian to Ordovician. In the lower Himalayas/Kashmir region, a complete column is shown except for the Triassic, but there are major gaps in the Ordovician and the Silurian.

Another example of a major region apparently possessing the entire geologic column in place is a part of the Bolivian Andes, described by Lohmann.[82] The area is called the Northern Antiplano; a region approximately 68°-70°W and 16°-18°S. But even here, the Cambrian and Ordovician are uncertain for lack of nearby outcrops. The Cordilleran area nearby (66°-68°W and 16°-20°S) also has an apparently complete column, but Jurassic strata are said to be scarce throughout the area.

It has already been demonstrated that the apparent completeness of the geologic column in Indonesia stems from ascribing metamorphosed "basement" to the entire Lower Paleozoic. Similarly, it has been pointed out by Ray and Achayya[91] that in eastern Burma, western Thailand, and Malaya the Permian and Mesozoic rest upon a folded and metamorphosed "basement" of inferred early Paleozoic. The alleged completeness of the geologic column shown for Cuba (Map 15) based upon data of the Ronov *et. al.* team can be questioned for the same reason. The work of Hatten[92] demonstrates how poorly known the pre-Mesozoic geology of Cuba is: Mesozoic rocks overlying metamorphosed equivalents of presumed Paleozoic strata.

All ten geologic periods are undoubtedly represented in the Swiety Krzys (Holy Cross) Mountains of south-central Poland (20-22E and 50-52N) as is evident from the local map of the mountain region enclosed in the work of Ksiazkiewicz, Samsonowich, and Ruhle.[93] In fact, the presence of all or almost all of the geologic column (in terms of sedimentary lithologies that are unambiguously biostratigraphically dated) can be shown to occur over much of Poland.[94,95] But only a very small percentage of the earth's land surface has most or all of the geologic column in place (Map 15, Figure 1 and 2).

Continental shelf data were not included in this article, but Ronov *et. al.*[11] noted that submerged shelves cover only 14% of the total continental area. Examples are now cited which show that they tend to have few and non-consecutive geologic periods represented. The report on the North Sea by Kent and Walmsley[83] reported only post-Devonian sedimentary strata, with usually only 4 or 5 of the 6 geologic periods represented per borehole.

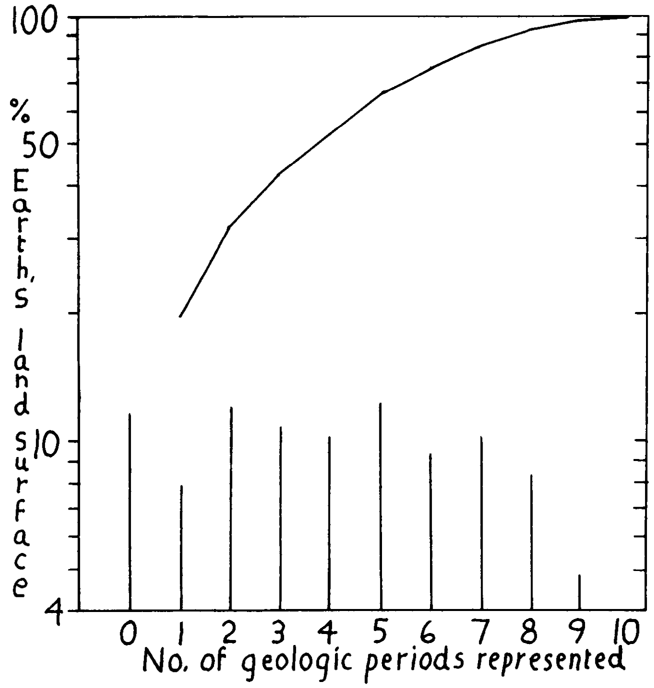


Figure 1. This semilogarithmic plot forms a histogram showing the tendency, by numerical abundance, for geological periods to be represented over the earth's land surface. The cumulative frequency curve above shows the per cent of the earth's land surface which has that many geological periods represented, or fewer. For example, 13% of the earth's surface has 5 of the 10 geological periods represented; while 66% has 5 or fewer represented. No more than about 1%, too little to show up on the graph, has all 10 periods.

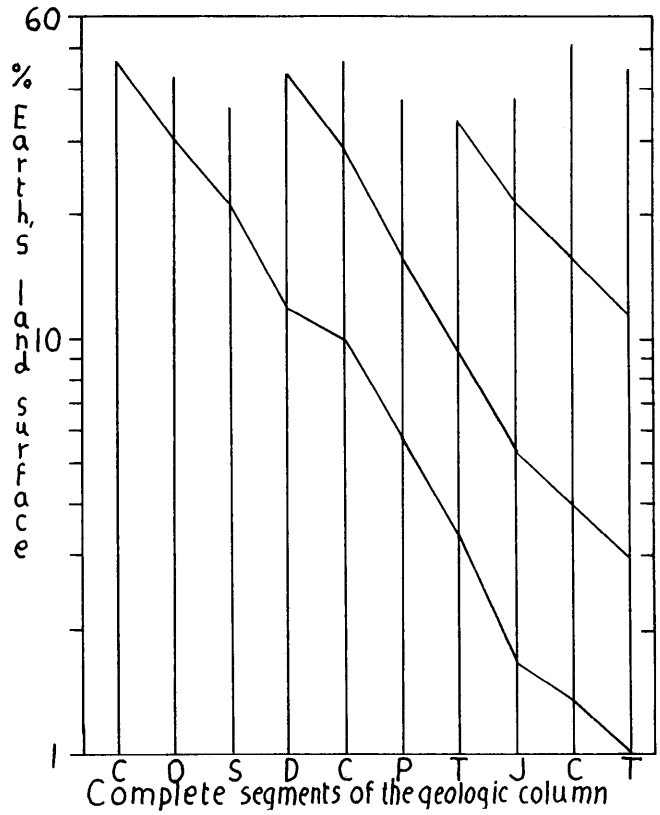


Figure 2. This semilogarithmic plot shows the tendency of the earth's land surface to have sequences of consecutive geological periods in place. The vertical bars form a histogram showing the per cent of the terrestrial areal coverage (on land) of individual geological periods. The curves show the decline of area covered with each younger geological period added. For example, 47% of the earth's land surface has Cambrian alone, 31% has both Cambrian and Ordovician, and only 21% has Cambrian, Ordovician and Silurian simultaneously represented.

The eastern North American continental shelf[84] from Florida to Nova Scotia has Jurassic, Cretaceous, and Tertiary rock, with a much smaller presence of Triassic. Link[85] pointed out that continental shelves tend to be dominantly Mesozoic and Cenozoic.

Continental data of this article would be completely overwhelmed by oceanic data if it were included. Blatt *et. al.*[86] said: "Almost all of the sediment preserved in modern ocean basins is younger than Triassic." The inclusion of oceanic data would therefore greatly increase the percentages of few and recent geologic periods. The percentages of many present geologic periods and many consecutive geologic periods, already minor, would become vanishingly small.

The more the earth's surface fails to display the vaunted evolutionary-uniformitarian geologic column in terms of actual presence and "correct" stratigraphic layering of geologic periods rocks, the more the geologic column passes into the realm of fantasy. Concerning geologic time, Douglas[87] wrote: "Time can only be established through recognition of events, as time itself is not measurable without an event to mark its passing. Furthermore, geologic events have a reality only through their manifestation in the rock record."

Recently, Gingerich[96] wrote: "The study of organic evolution is both a geological and a biological subject. Evolution means change, change implies time, and the great sweep of life history is recorded in sedimentary rocks and measured in geological time." The

Table 2. This table shows gross stratigraphic successional relationships: the per cent of each geological period overlying directly every older geological period. For example, 65.7% of Carboniferous lies upon Devonian, 10.3% upon Silurian, 5.82% upon Ordovician, 7.16% upon Cambrian, and 11.0% directly upon Precambrian "basement".

	C	J	T	P	C	D	S	O	C	pC
TERTIARY	72.0	8.78	3.93	4.62	3.23	1.85	0.231	0.231	0.693	4.39
CRETACEOUS		51.6	12.1	8.87	4.84	3.23	2.82	6.05	0.806	9.68
JURASSIC			54.8	18.9	11.4	5.05	3.19	1.86	0.798	4.00
TRIASSIC				58.4	18.4	5.63	3.75	0.938	0.938	11.9
PERMIAN					76.3	10.5	6.08	1.10	2.76	3.30
CARBONIFEROUS						65.7	10.3	5.82	7.16	11.0
DEVONIAN							52.1	20.5	8.83	18.6
SILURIAN								78.4	10.5	11.1
ORDOVICIAN									76.8	23.2
CAMBRIAN										100

significance of the geologic column to evolution is therefore obvious. Yet not only does this column basically not exist, but even where geologic periods' rocks *do* occur, their biostratigraphic basis *itself* is arbitrary. One need only consult the volume edited by Harland[97] to note that most fossil taxons overlap from a few to several of the ten geologic periods.

Of course, the absence of geologic periods is claimed to be a result of non-deposition during those periods in the regions of their absence, or to subsequent erosion. This is self-serving because there is no deterministic reason why the earth's land surface should (or should not) become *everywhere* depositional sometime within any span of several tens of millions of years comprising each geologic period. The claim of non-deposition and erosion during geologic periods begs the question, because it does not face the question whether or not these geologic periods ever existed in the first place.

Since only a small percentage of the earth's surface obeys even a significant portion of the geologic column, it becomes an overall exercise of gargantuan special pleading and imagination for the evolutionary-uniformitarian paradigm to maintain that there ever *were* geologic periods. The claim of their having taken place to form a continuum of rock/life/time of ten biochronologic "onion skins" over the earth is therefore a fantastic and imaginative contrivance.

III. Probable Diluvial Significance of Global Stratigraphic Trends

This section briefly considers how the findings of this work and related findings affect the Creationist-Diluvialist paradigm. Since it has already been demonstrated that the geologic column is not supported by what actually is found on earth, the principle of Occam's Razor favors the Creationist-Diluvialist paradigm because of its intrinsic abrogation of all concepts of evolution, geologic periods, and geologic time.

The fact that most of the earth's land surface has few of the ten geologic periods represented (Fig. 1) means that Diluviology needs to explain the stratigraphic separation of only a few fossil groupings over most terrestrial areas. Furthermore, the fact that most represented geologic periods tend not to be consecutive further implies that only a few groupings of fossil types exist over most areas. This says nothing of the long range of most fossil taxons.

The fact that Devonian, Jurassic, and Cretaceous appear to have special liberties not to rest on the next older geologic periods (Table 2) may have Diluvial significance. The Devonian has the first large-scale diversity of land fossils (although all geologic periods consist overwhelmingly of marine fossils), and its liberty may be due to the ecological independence of its terrestrial fossils from the almost wholly marine Lower Paleozoic as well as the poverty of the Lower Paleozoic in the Gondwana continents (Maps 1, 2, and 3).

The successional liberties of Jurassic and Cretaceous (Table 2) may support the position that they are post Flood and that their fossil populations are therefore truly successional and not part of the mutually-contemporaneous Flood-buried continuum of the older geologic periods.

The works of Ronov *et. al.*[11,88] and Schwab[89] consider volumes, compositions, etc., of rocks from the viewpoint of geologic periods. No geologic period has a monopoly on any type of lithology. However, submarine volcanogenic rocks decrease going from global Paleozoic to global Mesozoic. Terrestrial volcanogenic deposits increase drastically going from Paleozoic to Mesozoic and Cenozoic.

This may reflect the global tendency for Paleozoic rocks to have been formed during the Flood so that Volcanism was primarily submarine, while Mesozoic and Cenozoic have been formed during late Flood and post Flood conditions so that volcanism was subaerial rather than subaqueous in nature.

Those strata which are at or near the earth's surface at any given localities are the likeliest candidates for having formed under late and post Flood conditions. For instance, where Jurassic has a thick mantle of Cretaceous-Tertiary rock overlying it, the Jurassic in that case probably was a mid-Flood deposit. Jurassic with nothing overlying it, on the other hand, probably was late-Flood to post-Flood in origin. The fact that world outcrop areas of geologic periods decline exponentially going stratigraphically downward[90] probably reflects the ever-decreasing probability of older geologic periods' rocks to be primarily late-Flood and post-Flood in origin.

References

AG-American Association of petroleum Geologists Bulletin
EL-Elsevier Scientific Publishing Co., Amsterdam, London, New York
GE-Geology
GN-Proceedings of the International Gondwana Symposium
IG-International Geology Review
PA-Palaeogeography Palaeoclimatology Palaeoecology
SE-Sedimentary Geology
SO-Sovietskaia Geologiia
TE-Tectonophysics

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POPGEN I: COMPUTER SIMULATION OF POPULATION GENETICS

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The availability of relatively inexpensive computers has given many people access to the devices in schools, businesses, and even homes. Creationists will be able increasingly to test aspects of both the evolution and Creation models through the use of these "smart machines". This paper describes the use of a program to simulate a population of organisms in which the processes of reproduction, mutation, and natural selection are operating.

Population Genetics

A simplified discussion of the genetic principles involved may aid in the use of POPGEN I. Population genetics is concerned with the behavior of genes in populations rather than individuals. Interest centers on the *gene pool*, all of the genes possessed by all of the creatures in a population. Usually attention is focused on a single gene, which we can symbolize as A, and studies are made of the change through time in the relative frequencies of A_1 and A_2, the alleles of A. These frequencies are symbolized as p and q, respectively.

Three factors are most important in changing allele frequencies from generation to generation. Mutation can change A_1 to A_2, and the relative frequency with which that occurs is expressed as a fraction, u. Typical mutation rates are in the range 0.00001 to 0.000001. The mutation rate for achondroplastic dwarfism in humans has been estimated at 0.000042, which means that 42 out of one million times that the A_1 (normal) allele is copied, it changes to A_2 (the allele that produces dwarfism). Mutation can also change A_2 to A_1, but this is much less frequent and is ignored in POPGEN I.

A second factor that affects allele frequencies is natural selection. Unlike mutation, which acts on single genes, natural selection acts on the phenotype, the expression of the genotype. The amount of selection (s), is a number between 0 and 1. A phenotype with $s = 1$ is lethal, while $s = 0$ indicates that there is no selection against that phenotype. One may also speak of the fitness (w) of a particular phenotype, which is equal to 1-s. POPGEN I uses fitness values for the three possible genotypes A_1A_1, A_1A_2, and A_2A_2, to simulate the effects of natural selection.

The third factor affecting allele frequencies is drift, which refers to random changes in frequencies not caused by mutation or natural selection. Drift is particularly important in small populations where, for example, the death of a few individuals may change significantly the allele frequencies.

Description of the Program

Figure 1 is the program POPGEN I, which is written in BASIC for the IBM 5100 portable computer[1]. With modification to be described later, it can be run on the Radio Shack TRS-80, Level II. Other computers with BASIC and a random number generator can also use the program.

Statements 20-80 allow the user to specify all parameters of the program: population size, number of generations, initial frequencies of the alleles, mutation rate, and fitness of the three genotypes. Statements 110-180 print the parameters supplied by the user and the headings for the results of the simulation.

The rest of the program consists of two loops. Statements 190-520 loop for the number of generations specified, while statements 220-470 loop for the number of individuals in the population. Statement 200 calculates the probability (M) that an allele selected at random from the gene pool will be an A_1, that is, the relative frequency of A_1 (p) minus the probability that A_1 mutates to A_2 (u). Statements 240-260 generate a random number between 0 and 1 and compare it to M. If M is greater, an A_1 allele is selected; if less, an A_2.

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