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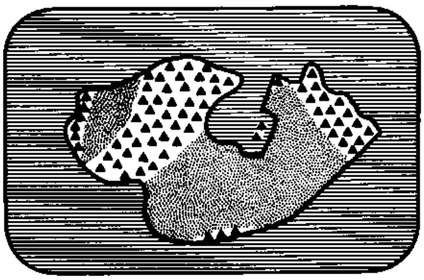

Stockwell Symposium on the Hudsonian Orogeny and Plate Tectonics

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Under the auspicies of the Canadian Geodynamics Subcommittee, a sympsium on the "The Hudsonian Orogeny and Plate Tectonics" was held in Ottawa, March 4 and 5, 1975. The symposium, held in the auditorium of the National Library, was in honour of Dr. C. H. Stockwell of the GSC. More than 300 participants attended the symposium, including a strong representation from industry.

R. A. Price, Chairman of the Geodynamics Committee, welcomed the participants and paid tribute to Dr. Stockwell for his numerous contributions to present understanding of the geology of the Canadian Shield.

In a review of Hudsonian events in the Canadian Shield, J. A. Donaldson traced the evolution of ideas about structural provinces of the Shield, emphasing the contributions by H. C. Cooke, M. E. Wilson, J. E. Gill, J. T. Wilson and C. H. Stockwell. He noted the importance of the Precambrian time-stratigraphic subdivision introduced by Stockwell, and compared it to time subdivisions widely used in Australia, Russia, India and U.S.A. (Fig. 1). Because the radiometric ages form similar clusters throughout the world, the events represented by the clusters are reasonable references for subdivision of Precambrian time. However, Donaldson stressed the need for caution in equating radiometric numbers with orogenies, noting that although there is widespread evidence for orogenies in the structural provinces, the question of what proportion of orogenic events occurred at the time of final-stage radiometric imprinting cannot be presently answered. For this reason, he further suggested that not only the Elsonian, but also the Hudsonian, Grenvillian and Kenoran, might best be referred to as "Events", rather than "Orogenies".

In his summary of the principal features of the Churchill Province and related terrane (Fig. 2), Donaldson stressed the common occurrence of granitic basement in many Aphebian fold belts, and the scarcity of lithologic

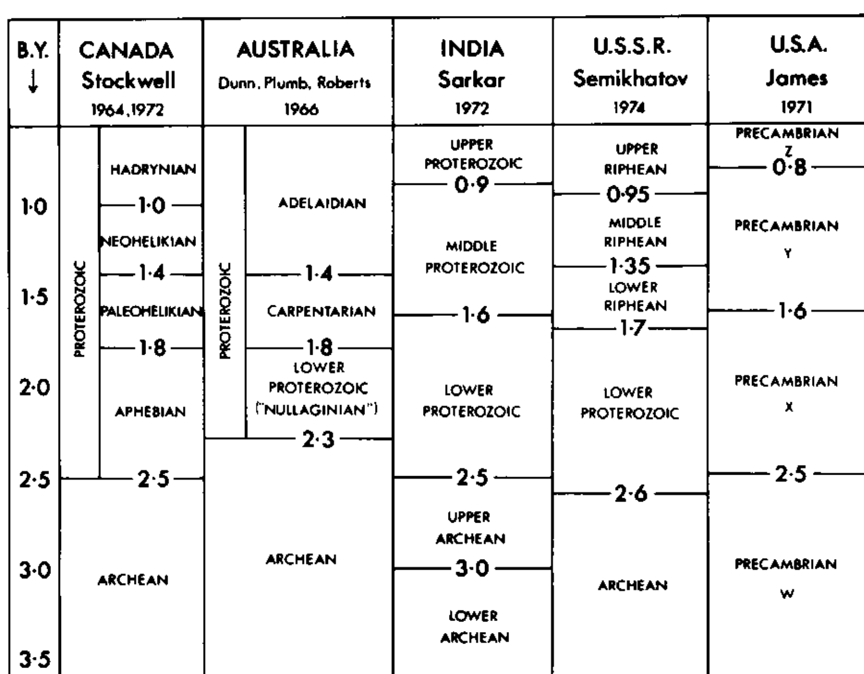

Figure 1
Terminology of subdivisions of the Precambrian.

associations typical of accumulation on oceanic crust. Evidence for extensive Aphebian oceans within the area now occupied by the Churchill Province is lacking, and he suggested that any related plate tectonic activity probably was limited to conservative opening and closing along rifts in pre-existing continental crust, rather than long-distance convergence and collision of unrelated plates during Aphebian time.

The geochronology of the Churchill Province was summarized by R. K. Wanless. Most of the geochronologic information consists of K-Ar ratios from minerals or whole-rock samples that have yielded ages within the range of —1600 to —1800 Ma. These values are now considered to be largely "uplift" ages, rather than primary ages of the rocks, but they do delineate the boundaries of the Province. More recent Rb-Sr whole rock and U-Pb zircon determinations are less abundant, but have been obtained from widely separated localities. These data indicate that extensive areas of the Province are older than —1800 Ma and that certain belts of volcanic and sedimentary rocks are Archean in age. Rb-Sr whole-rock isochron studies have also provided confirmation for K-Ar mineral ages previously obtained for some syntectonic and post-tectonic intrusions, thus precisely establishing their age and providing a younger limit for the Hudsonian Orogeny.

The geology of the Labrador Trough and Cape Smith components of the Circum-Ungava and Dorset Fold Belts was outlined in a paper by F. C. Taylor. The Aphebian successions of the Circum-Ungava Geosyncline comprise shallow-water sediments along the unconformity on the Archean craton that give way east and north to essentially basic volcanic and related intrusive rocks, and variable amounts of mudstones and related clastics. The Dorset Fold Belt contains abundant metasedimentary rocks (marble, quartzite and quartz-rich gneisses) but only local occurrences of rocks that could be metamorphosed equivalents of volcanic strata. The Circum-Ungava Belt is considered by Taylor to be an ensialic basin that extends to the Nain Province. Possibilities of plate tectonic models were assessed, but he suggested that present available data do not strongly support such models for the Circum-Ungava Geosyncline.

B. Dressler described a cross-section of the Labrador Trough based on his mapping in the central part of the trough north of Schefferville. The three sedimentary cycles defined by the work of Dimroth are present in the miogeosynclinal facies of this area. Bands of olivine-melilite tuffs that occur in the upper iron formation of the second cycle are related to a carbonatite-lamprophyre suite of rocks mapped in the area. A lamprophyre of this suite has yielded a K-Ar whole rock age of —1873 Ma. Inliers of Archean basement in miogeosynclinal rocks were affected by a weak retrograde Hudsonian metamorphism. A small number of chemical analyses suggests that igneous rocks of the eugeosynclinal facies are lower in K_2O than gabbros in the miogeosyncline. Dressler endorsed ensialic origin for the portion of the Labrador Trough that he has studied.

The Aphebian Snyder Group of Northern Labrador was described in a paper by S. A. Morse, J. M. Barton, J. A. Speer, and J. H. Berg. The Snyder Group, comprising units of quartz pebble conglomerate, quartzite, siltstone, ironstone, greywacke, amphibolite and granulite, is preserved along the margins of the Kiglapait anorthosite complex. The anorthosite intrudes the Snyder strata and deforms and metamorphoses the sediments. A single deformation and metamorphism related to the Kiglapait intrusion is postulated. A minimum Rb-Sr isochron age of —1842 Ma for the Snyder Group indicates that these Aphebian strata escaped Hudsonian deformation and metamorphism, and were deformed only by Elsonian intrusions. Morse and his co-workers suggested that the Snyder rocks may be related to strata of the Piling Group on Baffin Island, rather than the Ramah Group (which more likely correlates with the Mugford Group, to which an age of —2400 Ma has been assigned). Other pre-Hudsonian rocks of northern Labrador include gneisses in two areas

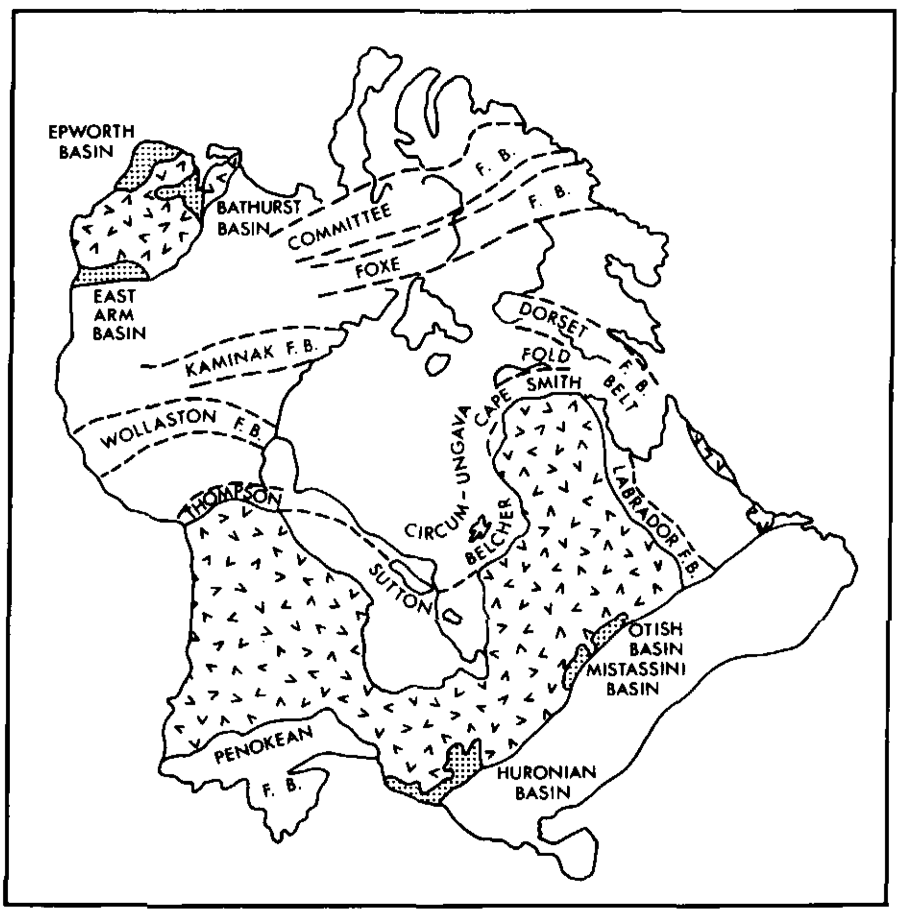

Figure 2
Fold Belts (F.B.) and basins of the Churchill Province and related terrane.

that have yielded ages of —3600 and —3400 Ma, and layered basic sills (possible ophiolites?) that are older than —2600 Ma. Post-Hudsonian anorthosites and associated adamellites have yielded ages of —1400 Ma and —1290 Ma respectively.

R. T. Bell summarized the results of his work with K. R. Barrett, S. R. Leggett and A. F. Stirbys in the Belcher Islands. The 14 units of the Belcher Group record evolution from a platform-miogeosynclinal suite of carbonates and sandstones (interrupted by separate periods of terrestrial volcanism and calc-flysch deposition) to a eugeosynclinal suite of submarine volcanics and turbidites (terminated by an exogeosynclinal molasse suite). The paleoslope was inclined to the west during the platform stage, but was reversed during the eugeosynclinal stage. Although folding of the Belcher Belt has resulted in structual shortening of almost 30 per cent, Bell suggested that much of the deformation may have been accommodated by décollement along evaporite horizons in the lowermost unit. Bell and his co-workers infer that deposition of the Belcher Group occurred on continental crust, and in parallel to interpretations for the Labrador Geosyncline, believe that plate tectonic models need not be invoked.

The Foxe Fold Belt of Melville Peninsula was described by J. R. Henderson, who developed an impressive model of lithologic and structural relationships within this belt. Paragneiss, quartzite and marble of the Aphebian Penrhyn Group unconformally overlie a basement that consists predominantly of granitic gneisses. Recent dating of zircons indicates that the eugeosynclinal Prince Albert Group may belong to this Archean basement. The Penrhyn Group is a miogeosynclinal assemblage of metasedimentary rocks, and although a few syntectonic and post-tectonic granites have been recognized, major Hudsonian intrusions have not. The Foxe Fold Belt thus seems to represent a foreland zone rather than a mobile zone. Striking map patterns of dome-like basement structures enveloped by Penrhyn strata are interpreted by Henderson in terms of rootless diapirs and detached nappes. Plunges of less than 10°NE appear to be regionally consistent, and several periods of folding are inferred. Comparison with possible plate tectonic models has led Henderson to suggest that deformation and metamorphism of the Foxe Fold Belt could have resulted from collision and suturing of two Archean continents during the Hudsonian orogeny, but he emphasized that this certainly is not the only possible interpretation.

Strata of the intracratonic Kilohigok Basin were described in a paper by F. H. A. Campbell and N. P. Cecile. These authors provided documentation to show that the stratigraphy reflects regional tectonic events recorded in the miogeosyclinal Epworth Group and Athapuscow Aulacogen of the Coronation Geosyncline. Easterly derived fluvio-deltaic clastic characteristic of the lower parts of the Kilohigok and Athapuscow succession are laterally equivalent to thick platformal stromatolitic strata in the miogeosyncline, which apparently was separted from the Kilohigok Basin by a weakly positive arch. Subsequent deposition of sands on the platform was followed by regional emergence, resulting in the formation of paleosoils in all three areas of the geosyncline. Subsidence of the miogeosyncline was accompanied by deposition of westerly and northerly derived detritus from the eugeosyncline, while easterly sources continued for the Kilohigok Basin. Stabilization in all three areas produced a stromatolitic carbonate platform in the basin and aulacogen, and calc-flysch in the miogeosyncline. In all these areas, final deposition is recorded by evaporitic red tidal muds and coarser clastic debris derived from the uplifted eugeosyncline.

M. R. Stauffer discussed relationships between the Amisk and Missi Groups near Flin Flon, Manitoba, in terms of plate tectonics. Metavolcanic rocks of the Amisk Group, formerly thought to be Archean, now appear to be Aphebian on the basis of recent age dating. An island arc environment is postulated on the basis of lithology, primary structures and major-element compositions. Uplift in response to subduction is postulated as the cause of erosion to provide debris for molasse sedimentation of the Missi Group, followed by metamorphism, intrusion and complex deformation during the Hudsonian Orogeny.

W. Weber presented a paper interpreting the Wollaston Fold Belt and Kisseynew Gneiss Belt in terms of plate tectonics. He postulated that the Wollaston Fold Belt, consisting of Archean basement rocks mantled by Aphebian cratonic supracrustal rocks, collided with the northwestern edge of the Superior block during the Hudsonian event. This resulted in deformation of the intervening Kisseynew Gneiss Belt, interpreted by Weber to represent a eugeosynclinal zone in which volcaniclastic turbidites accumulated during Aphebian time.

In a paper dealing with the southern part of the Wollaston Fold Belt and flanking terranes, J. F. Lewry presented a model for Hudsonian deformation in regions mapped in collaboration with T. I. Sibbald. Lewry pointed out that because the "Wollaston Fold Belt" appears to be neither an independent fold belt nor the site of a discrete depositional trough, designation as the "Wollaston domain" is more appropriate. Seven such lithostructural domains are recognized in the southwestern part of the Churchill Province. Magnetic trends are generally parallel to these domains, and there is continuity of strata between them, with little evidence of significant structural discordance between most domains. Two of the domains appear to be Archean cratonic elements only mildly reworked during the Hudsonian; others, including the Wollaston domain, appear to be elements of Hudsonian mobile belts comprising variable proportions of totally remobilized basement and Aphebian cover rocks. Structures generally are simple, with no evidence of recumbent folding. The model of tectonic evolution proposed is similar to Haller's interpretation of the Caledonian belt of East Greenland. Accordingly, an infrastructure of continuous granitic basement beneath a superstructure of Aphebian cover rocks is thought to have been deformed by "gneiss-dome tectonics" to produce a symmetrically deformed fold belt of which the Wollaston domain is but a part.

In a paper based on studies of isotopic age determinations, thin-section studies of polymetamorphic textures, and multivariate analysis of mineral and major element chemical compostions of samples from the Precambrian basement beneath Phanerozoic cover, R. A. Burwash summarized the history of the western Canadian basement. At —2500 Ma a single sialic plate is thought to have encompassed the western

Shield and its subsurface extensions. At about —2200 Ma lower Aphebian cover was intruded by easterly trending basic dykes. A mobile zone named the Athabasca zone developed south of the Slave Province by cataclasis of the Archean crystalline complex at about —2000 Ma. Progressive cataclasis was accompanied by formation of chlorite and epidote, loss of sulphides and heavy trace metals and addition of silica and hematite by growth of new microcline and biotite. K-Ar ages of biotite of about —1800 Ma date the last event.

W. R. Van Schmus reviewed the geochronologic data for the Great Lakes region, noting that plutonic, deformational and metamorphic events generally assigned to the "Penokean Orogeny" actually span a time interval of more than 300 Ma, beginning about —2000 Ma. Within this period, several more or less discrete orogenic events appear to have occurred. Although the sequence of events and the lithologic associations in the Penokean Fold Belt are in many respects similar to those of the Churchill and Bear not simultaneously subjected to widespread orogenic activity. Rather, the general similarities for these regions are interpreted by Van Schmus to reflect increased tectonic activity during late Aphebian time.

K. C. Condie summarized the radiometric, lithologic and geochemical data for Precambrian rocks of the southwestern United States. Several age provinces are now well defined, including a northeasterly trending province extending from southern California and northwestern Mexico to Wisconsin. Rock associations in this province, which is characterized by Hudsonian dates (—1650 to —1850 Ma), were compared by Condie to associations characteristic of modern subduction systems. He related subsequent evolution (—1850 to —1050 Ma) to continental rifting in response to northwestward movement of the North American plate over a mantle plume (or plumes), resulting in southeastward migration of the zone within which rifting continued to occur.

On the basis of considerable radiometric and geological data, F. A. Hills and R. S. Houston presented a tectonic interpretation of the relationship between the Wyoming Province (Archean) and Central United States Province (Precambrian X, roughly equivalent to Aphebian). Their data appear to be compatible with a plate-tectonic model in which an Atlantic-type margin developed on the southern edge of the Archean craton (Wyoming Province) in Aphebian time. This craton is thought to have collided with, and been partially subducted beneath, a volcanic arc to the south at about —1725 to —1635 Ma. The hypothesized subduction zone dipped southward, and is now marked by a major shear zone that ranges in width from a few hundred metres up to seven km.

M. D. Thomas described the gravity field of the eastern Churchill Province with emphasis on the boundary anomalies. The Grenville-Superior (and Grenville-Churchill) boundary is the best studied by geophysical methods. Bouguer gravity values decrease gradually from the older to the younger province, attain a minimum within the boundary zone and then increase sharply to a background level some 15 to 20 mgal higher than over the older province. This anomaly can be explained by isostatically compensated, juxtaposed crustal blocks of different mean density and thickness. The denser block is about five km thicker and corresponds to the younger Grenville Province. This difference in thickness of the blocks is supported by seismic data. In the model the density discontinuity penetrates the crust and is interpreted as marking a cryptic suture between collided continental fragments. Location of a suture within the Grenville Province was suggested by Irving, Emslie and Ueno from paleomagnetic results. Thomas showed that similar gravity signatures at other boundaries of the eastern Churchill Province (Labrador Trough, Cape Smith Belt) can be interpreted using the same model. Alternating regional positive and negative anomalies east of the Labrador Trough were attributed to large-scale block structure within the Churchill crust. An analogy was drawn between this structure and the structure of the Peruvian Andes.

In his presentation describing the gravity anomalies at boundaries of the western Churchill Province, R. A. Gibb first reviewed the Grenville example and then showed that the model can be applied to the gravity signature over the Chûrchill-Slave boundary (Thelon Front). Gibb then described the aeromagnetic anomalies associated with the Thelon Front. A broad belt of high magnetic anomalies extends from north of the Bathurst Fault to the McDonald Fault within the Churchill Province. Magnetic patterns revealed three previously unrecognized, major transcurrent faults probably related to the Bathurst fault system. The magnetic belt is largely underlain by granulites and coincides in part with a positive regional gravity anomaly. This belt peripheral to the Slave Province, with distinctive magnetic and gravity signatures and offset by major transcurrent faults, was compared with the Pikwitonei Subprovince (Fig. 3). Gibb suggested that the Churchill-Slave boundary may be similarly located at the eastern margin of the magnetic belt. By analogy again with the Pikwitonei Subprovince, the underlying granulites may represent an exposed portion of Slave basement rocks (lower crust?) uplifted and emplaced perhaps during collision of the ancient cratons.

Thermal effects occurring deep within the Superior Province at the time of the Hudsonian event were described by J. Hanes and D. York. Of expecial interest was their A^{40}/A^{39} work on Abitibi diabase from Munro Township. A gas-release "plateau" for pyroxene mineral separates indicates an age of about —200 Ma, comparable to the age determined by Gates and Hurley using the Rb/Sr whole-rock isochron method. Feldspar mineral separates also yielded an excellent plateau, indicating and age of —1800 Ma. Apparently a "Hudsonian" heating event has completely reset the feldspars. These results indicate that thermal effects during the Hudsonian orogeny were not confined to the Churchill Province but occurred well within the Archean Superior craton.

M. Berry and J. D. Forsyth reported on seismic crustal refraction experiments which have taken place within the Hudsonian "orogenic" areas over the past decade. The Early Rise Experiment of 1966 with its shot point in Lake Superior and profiles radiating out to several thousand kilometres indicated that the crust thickens dramatically from 30 to 35 km beneath the Superior Province south of the Thompson Belt to 40 to 45 km beneath the Churchill Province to the north. The Yellowknife Refraction Experiment (1969) showed that the East Arm structures of Great Slave Lake are represented by a minor depression on the Moho. The Hudson Bay Experiment (1965) showed the northern Keewatin area to have a thinner crust and a higher upper mantle velocity *than the area immediately to the south.* Berry also made a brief reference to the present distribution of seismicity with respect to Hudsonian features. With the exception of structures in the northern Keewatin and the Cape Smith-Wakeham Bay areas, Hudsonian structural features are largely aseismic.

G. F. West discussed the relationship between geological and geophysical *data along the boundary between the* Churchill and Superior Provinces and the significance of the data relative to the evolution of this structure. A great deal is known about this relationship, but the highly deformed nature of the rocks and the presence of sedimentary cover to the east and the south leave much that is still in the nature of speculation. Abundant geophysical data collected during the course of exploration programs in the south provide a basis for suggesting that the southern extension of the lineament has a geology which *differs from that of the central* Thompson area. In general the rocks are less deformed and contain more mafic volcanic rocks. In many ways the southern extension presents a picture similar to that of the Keewatin mid-continent lineament which extends southward from western Lake Superior. Based on this analogy and other information, West suggested that a mantle hotspot developed in the general vicinity of what is now the Thompson

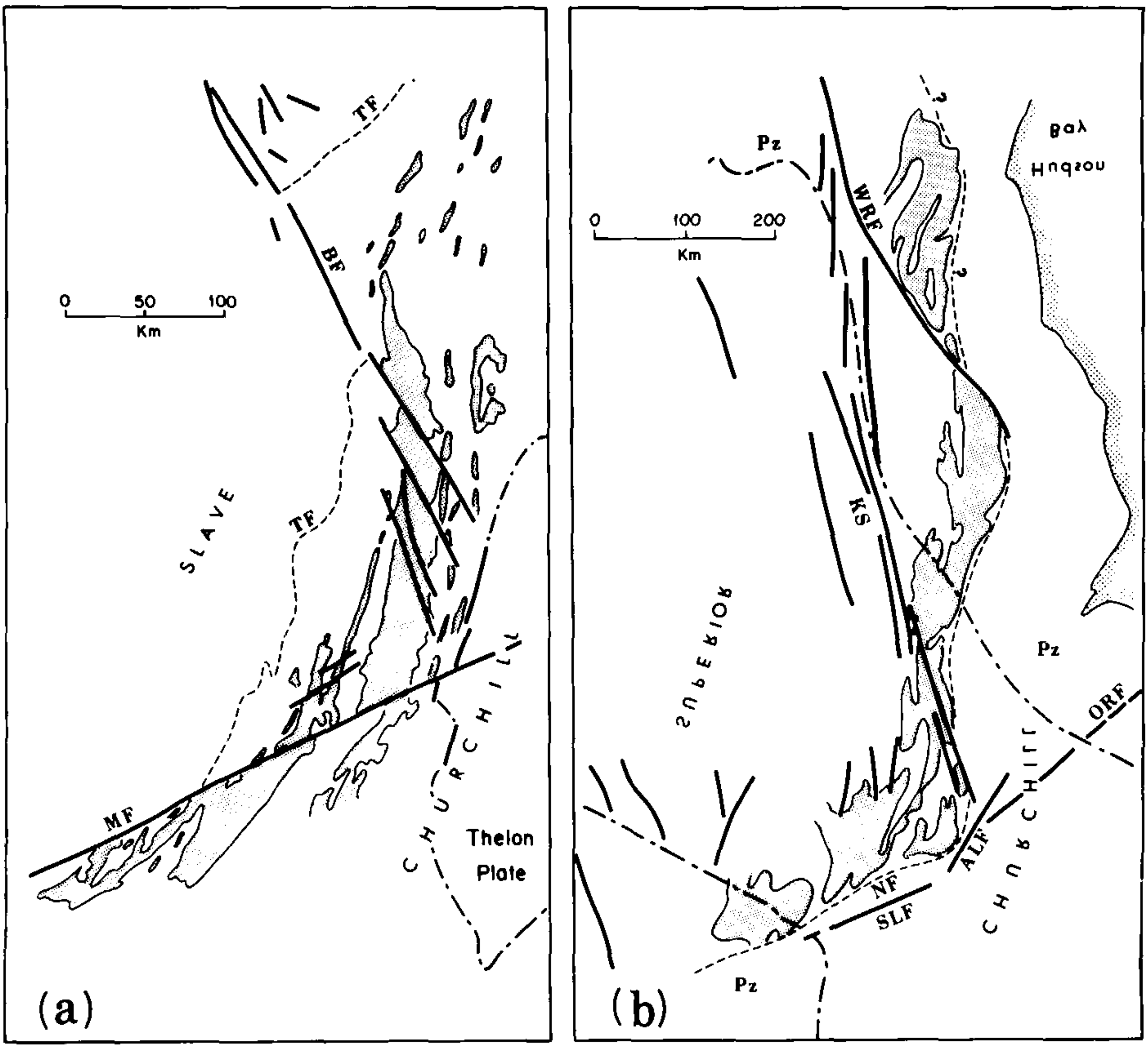

Figure 3
Comparison of Churchill-Slave boundary (a) with Pikwitonei Subprovince (b, reversed to show resemblance).

area, and that this produced crustal rifting about a triple junction. The southern and eastern arms developed into minor openings whereas the northwest arm developed into a large basin, the Kisseynew basin. The development of the triple arm was accompanied by considerable basic volcanism and by sedimentation in all three arms. Subsequently the whole region was thermally involved in the Hudsonian Orogeny.

A paper of great importance for our understanding of the buried "Hudsonian" basement of the central plains of North America was given by P. A. Camfield, A. O. Alabi and D. I. Gough in which a deep electrical conductor extending from Colorado through the Black Hills of South Dakota to Central Saskatchewan was described. In the north the conductor apparently passes into the Wollaston Lake Fold Belt, and in the south into the boundary between the Archean terrain of Wyoming and the early Proterozoic terrain farther to the southeast. The conductor could be due to the presence of graphite or sulphides in the rocks. Whatever its cause, it is clearly a first-order feature of the buried shield.

R. L. Coles described a geomagnetic anomaly map of the western Canadian Shield which he and his colleagues G. V. Haines and W. Hannaford derived from high-level (3.5 to 6.8 km above sea-level) airborne magnetometer surveys. Observations taken at this altitude show only the comparatively long wave-length magnetic anomalies; of particular interest are several anomalies associated with the McDonald Fault which indicate possible right-lateral relative motion along the fault of the order of 300 km. Also of note is the abrupt change in character of the anomalies west of about the Rocky Mountain Trench, indicating that this is the buried western edge of the Churchill Province.

Although a paper on modern plate tectonics by E. R. Kanasewich was not given because of illness of the author, it is worthwhile noting the important features of his intended talk. The author has carried out a very simple geometrical analysis of the modern earth showing that there are two very large antipodal plates (the African and Pacific megaplates) which are approximately circular and have a radius of 60°. The other plates are very much smaller and are elliptical with average major diameters of 62° which are systematically oriented at angles of 56° to the great circles between the centres of the megaplates. This highly organized distribution is, Kanasewich argues, most likely to arise from convection involving the entire mantle and not to convection confined within the asthenosphere. His argument, if correct, is of great importance to our understanding of Phanerozoic global tectonics and thus to any ultimate investigation of Precambrian global tectonics.

A second paper on modern plate behaviour was by D. I. Gough and J. H. de Beer who described a prominent electrical conductivity anomaly, deep within the lithosphere, linking the middle Zambezi portion of the Great African Rift system to the Walvis Ridge. The anomaly zone is also marked by seismic activity. Gravity evidence is consistent with crustal thinning along this anomaly zone. Studies of such electrical anomalies may ultimately have much to tell us about basement reactivation in Precambrian terrain.

Hudsonian thermotectonism in the West African and Guayana Cratons was discussed in a paper by P. M. Hurley and H. E. Gaudette. In a pre-Mesozoic reconstruction with the Guayana Shield of South America rotated 40° into a position adjacent to Africa, a narrow Pan-African belt can be recognized between the two regions where the South Atlantic now exists. Although an Archean basement may have been pervasive throughout much of the Guayana Shield, most rocks of this region were strongly affected by the Transamazonian event at —2000 Ma. Precambrian rocks are progressively younger toward the extreme west and southwest. Considerable extent of Precambrian crust in South America is indicated by rocks of Precambrian age which occur in the Venezuelan Andes and in the Santa Marta peninsula of Columbia. Scattered relics of Archean crust also occur in the West African Craton, but like the Guayana Craton, ages of —1500 to —2000 Ma predominate. Detrital zircons from the Sahara region of North Africa, and from parts of southern Europe, show an ubiquitous initial age of —1800 to —2000 Ma; the most likely provenance appears to be the West African-Guayana Craton, but other regions of Hudsonian terrain (including the Churchill Province) may have contribued detritus during pre-Mesozoic intervals of suitable proximity.

Paleomagnetic evidence was described in three papers. In the first by P. L. Lapointe, J. K. Park and J. L. Roy, the polar track for the interval —2300 to —1800 Ma of rather simple form was described (Fig. 4, Track 5). This track stretches from the Arctic Ocean across North America to the Caribbean, and is based on data from many parts of Laurentia including the Slave and Superior Archean blocks. This result indicates that there probably has not been large-scale motion among the constituent elements of Laurentia in that time interval, although it would be possible to have had the opening and closing of small basins. In the second paper by E. Irving, the polar loop for the interval —1900 Ma to —1500 Ma was described (Fig. 4). Such loops are the characteristic signature of plate tectonics, and this indicates that marginal tectonics (the Coronation Geosyncline) was operating. The only evidence for large-scale relative motion of Slave and Superior Provinces during the Aphebian is the pole from the Dogrib Dykes which does not fall on the tracks. If this is truly indicative of relative motion then the motions were apparently completed by about —2200 Ma. One result of much interest is the excellent agreement in age and pole position between the Dubawnt Group which rests unconformably on gneisses of the Churchill Province, and the Kahochella Group which comprises early deposits of the Coronation Geosyncline (Pole KD in Fig. 4). Hence "Hudsonian" deformation in the Dubawnt region must have been completed before the Coronation Geosyncline was deformed. Irving emphasized the very considerable uncertainites in paleomagnetic studies. In a third paper by M. E. Evans new results for the Great Slave Supergroup were given. The poles from the Great Slave Supergroup (near KD in Fig. 4) were rather closely grouped with the exception of aberrant directions from the Stark Formation near Snowdrift which are best explained by assuming 60° clockwise rotation of a small segment near Snowdrift. This is consistent with dextral strike slip on the McDonald Fault system.

A paper by J. C. McGlynn provided an overview of the Hudsonian Orogeny in relation to the nature of the crust during Proterozoic time. He started by commenting on the paleomagnetic data, which presently support essential coherence of most of the Canadian Shield during Proterozoic time. Initially, large areas of the Churchill Province were underlain by Archean rocks, some of which were subsequently reworked to varying degrees by later deformation. During Proterozoic time, three phases of deposition can be identified. The oldest in early Aphebian time may have occurred in rather narrow linear basins around large blocks of Archean crust. These were deformed and metamorphosed in orogenic zones within these basins. A second phase comprises red beds and volcanic rocks of late Aphebian or early Helikian age in restricted basins along major fault zones or incipient rift zones. Major fault zones and zones of cataclasis were numerous in the western Churchill Province during this time. A third phase consists of deposits of mature clastics and carbonates in broad basins that may have covered much of the western Churchill Province. The nature of the sediments and of their deformation in these three phases suggests conditions of increasing crustal stability during Proterozoic time.

McGlynn argued that in Aphebian time, as internal parts of the Proterozoic continental masses were deformed, marginal geosynclines similar to Phanerozoic geosynclines that result from plate interactions were formed, examples being the Coronation and possibly the Circum-Ungava Geosynclines. Paleomagnetic and geochronological evidence suggests that the Coronation Geosyncline (and its related orogeny) is younger than the Aphebian basins (and their attendant orogenies) in the interior of the continental mass. As more evidence accumulates, it therefore will be necessary to modify the concept of Hudsonian Orogeny.

In all, 30 papers were presented during the two-day symposium, providing a wide variety of interpretations for various geological and geophysical aspects of the Churchill Province and related regions. Although the papers will not be published in a single volume, most can be expected to appear separately in the near future, and abstracts were distributed to all participants. The symposium, which proved to be an effective vehicle for exchange of ideas among geologists, geochronologists and geophysicists, provided many new insights into the possible role of plate tectonics during the Precambrian. Most important of all, Cliff Stockwell thoroughly enjoyed himself.

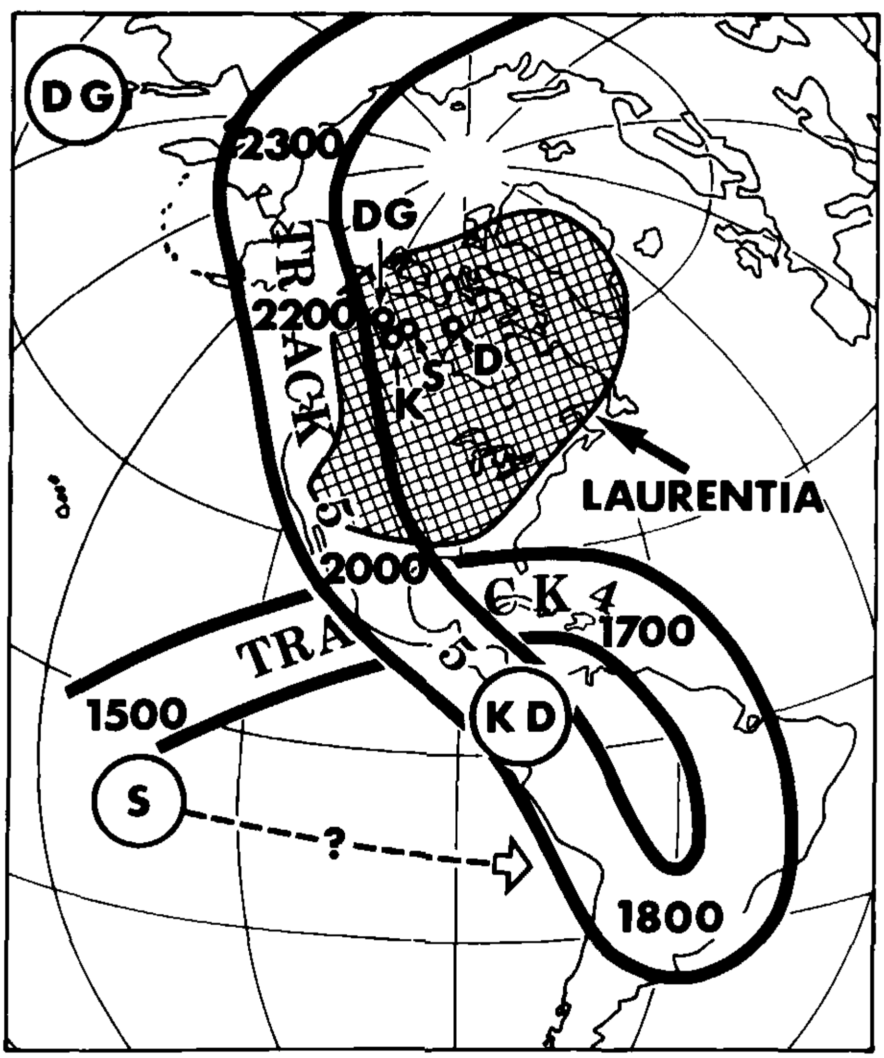

Figure 4
Polar track for the interval —1500 Ma to —2300 Ma

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