

The Expanding Pacific

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II

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The English version accessible at – www.wrocgeolab.pl/Pacific.pdf
(the address is for readers who have got the present paper not from my webpage).

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Introduction (2013)

The Pacific plays an extraordinary role in contemporary geotectonics and this role dates back to Wegener's theory. Earlier, in the time of the land-bridge theory, the development of all the oceans was considered in the same way, as progressive, and this progressiveness was well-documented by paleontological and sedimentological data. As is known, the land-bridge theory wrongly assumed the origin of the oceanic basins by sinking of continental crust. Wegener discovered the true extensional development of ocean basins. But considering this process on a tacitly assumed non-expanding Earth, he was compelled to assume that Pacific develops in the opposite way, that is by shrinking. This same assumption and bizarre behaviour of the Pacific was inherited by plate tectonics. The assumption, combined with the subsequent discovery of the spreading (expansion) of the Pacific ocean floor, which had been unknown to Wegener, has led to a whole series of further bizarre situations as described in the presented paper. What is more, the (allegedly) shrinking up to now Pacific ocean has given birth conceptually (in the framework of plate tectonics) to a whole array of similarly shrinking and closing oceans in the past. This in turn gave birth to the concept of exotic terranes which try to explain why assumedly shrinking oceans have transoceanic geological similarities which in fact point to their opening. The end result, as these concepts have been applied to regional analyses, has been to bring regional geological interpretations down to the level of absurdity. I present details of this conceptual process and its consequences in an extensive paper (51 pages), "Terranes: Or geology in wonderland" (Koziar, 2006). I also present in that paper simple regional solutions on an expanding Earth to some of these extremely complicated terrane interpretations on a non-expanding Earth. The paper is not yet available in English.

The bizarre position of the Pacific in Wegener's theory led Carey to formulate the "Pacific Paradox" (Carey, 1976) and conduct his test (Carey's test) already in 1958. The test is presented and refined in the present paper. The result – the elongation of the perimeter of the Pacific and thus the progressive development of this ocean – is one of the proofs of the expansion of the Earth. It is presented together with three other independent proofs of the expansion in Koziar, 2004 (www.wrocgeolab.pl/handbook).

The growing perimeter of the Pacific means tension and divergent movement of the lithosphere perpendicularly to this perimeter and thus perpendicularly to the Pacific island arcs and active continental margins. This is diametrically opposed to the plate tectonics concept of convergence (subduction) in these regions, based on data showing firmly the spreading of the ocean floor and speculative deduction from the expressed below fundamental assumption that the Earth is not expanding:

"If the earth is not expanding, there should be other boundaries of crustal blocks along which surface crust is shortened or destroyed." (Le Pichon, 1968, p. 3673)

Direct analysis of the structure and development of the island arcs and active continental margins (without any global assumptions) indeed reveals their divergence, driving the tension-diapiric-gravitational mechanism of these zones (Koziar and Jamrozik, 1994, www.wrocgeolab.pl/margins1.pdf; Koziar, 2003, www.wrocgeolab.pl/margins2.pdf).

The progressive development of Pacific leads to its reconstruction in a manner quite opposed to Wegener's theory and plate tectonics. A schematic, rough version of such a reconstruction is made in the present paper. It is compatible with the author's reconstruction of Gondwana on the expanding Earth (Koziar, 1991; www.wrocgeolab.pl/Gondwana.pdf).

The original version of the presented paper was published in the Polish language and all figures were in black-and-white. Now the figures are in colour. The text and figures are loosened, the list of contents is added, subtitles are numbered and some are added.

The original Polish title of the paper is: “Rozwój Pacyfiku i jego znaczenie dla współczesnej geotektoniki” (“Development of the Pacific and its significance to the contemporary geotectonics”). In the current translation, the title has been made shorter and more direct: “The Expanding Pacific”.

J. Koziar
November 2013

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1. Land-bridges theory

According to old geotectonic hypotheses, the origin of the Pacific was the same as that of the other oceans. The first scientific, well-elaborated theory of the development of these structures which dominate the Earth's surface, was the land-bridges theory. It assumed, in its developed form (e.g. Haug, 1900), that the whole surface of the globe had formerly been covered by continental crust. Ocean basins subsequently developed in the Meso-Cenozoic eras as a result of the sinking of portions of this crust.

The data on which the land-bridge theory was constructed (paleontological and lithological connections between continents, former transport of sediments from the area of today's oceans) essentially showed nothing more, than that today's oceans did not exist in pre-Mesozoic time. Situating the hypothetical sunken continental crust in the area of today's oceans was an initially plausible explanation of the recorded facts, but these facts – as was subsequently shown – should be explained in a different way.

2. Theory of the permanency of the oceans

Meanwhile, however, the hypothetical sinking of the continental crust was questioned by geophysicists on the basis of the theory of isostasy.

The geophysicists developed their own theory of permanency of the oceans and in so doing neglected the substantial data on which the land-bridges theory had been based.

The theory of permanency of the oceans was later connected with the theory of continental growth by accretion. As a result, a sharply contrasting picture of the development of the Earth's surface was created. The basaltic crust of the ocean floors (discovered in this period) was now regarded as primary. In the new conception, the extent of basaltic ocean floor gradually diminishes as the extent of continental granitic crust grows by accretion, starting from continental embryos.

It must be noted, however, that according to both theories, the Pacific had a common origin with that of the other oceans.

The hypothesis of permanency of the oceans did not eliminate the land-bridges hypothesis. For a time both hypotheses existed side-by-side and developed in parallel, leading to a deep crisis in geology and geotectonics.

3. Wegener's theory

A way of solving this severe contradiction was found by Alfred Wegener who postulated that ocean basins were created as continents moved apart.

Such a solution avoided objections to the land-bridges theory pointed out by supporters of the theory of permanency of the oceans. On the other hand Wegener's theory well explained other strange, additional facts: the similarity of the contours of some continents and the matching of their marginal geological structures.

However, Wegener's solution was a partial one, applicable only to the oceans that formed in the course of the break-up of his supercontinent Pangaea, i.e. the Atlantic and the Indian Oceans. The Pacific was expected to behave in quite the opposite manner. It was expected to be much older in origin and its area was expected to be decreasing with time.

For the first time the origin of the Pacific was treated as being very different from that of other oceans, despite the record of numerous connections between its separated margins, which even after the publication of Wegener's theory continued to be interpreted from the point of view of the land-bridge theory (e. g. Gregory, 1930).

Wegener's scheme of development of the Pacific was accepted in the 1960s by plate tectonics.

4. Expanding Earth theory

Already in 1933 Hilgenberg applied globally Wegener's solution to the contradiction between the land-bridges and permanency hypotheses, while eliminating both. He did it by closing the Pacific simultaneously with the other oceans. "Hilgenberg's Pangaea" (in Oberc's phrase of 1986) covered the whole globe, which consequently must have been much smaller in size than today's Earth.

Earth expansion (a process postulated earlier by Jarkowski (1888), and Lindemann (1927)) explains on a global scale the facts gathered in the framework of the land-bridges theory, and once again provides for a development of the Pacific which is the same as the other oceans.

So the origin of the Pacific had become, already in the interwar period, a crucial test between Wegener's theory and the theory of Earth expansion.

5. Expanding Earth versus Wegener's theory in relation to the development of the Pacific

According to Wegener's theory:

1. There should be no mechanism creating oceanic crust in the Pacific.
2. The sediment cover in the Pacific should be old and thick.
3. The Pacific crust should be much older than in the other oceans.
4. The perimeter of the Pacific should be diminishing with time.

According to the expanding Earth:

1. There should be a mechanism creating new oceanic crust in the Pacific.
2. The sediment cover of the Pacific should be young and thin.
3. The Pacific crust should be young and its age ought to be similar to that of the other oceans.
4. The perimeter of the Pacific should be increasing with time.

6. Subsequent complication of the development of the Pacific by plate tectonics

Intensive exploration of the oceans, carried out in the postwar time, successively revealed facts which showed more and more distinctly the correctness of the theory of Earth expansion.

However, as new facts showed the similar origin of all the oceans, new *ad hoc* hypotheses were invented within the framework of plate tectonics in order to bring these into line with Wegener's scheme, and further complicated the supposed progressive diminution the area of the Pacific.

And thus:

1. The discovery of the ocean ridges and spreading of the ocean floor in the Pacific has led to combination of expansion of its lithosphere with contraction of its surface area.
2. Discovery of small thickness of the sedimentary cover of the Pacific floor (exactly the same as in the other oceans) was explained by the exchange of old lithosphere for a new one.

3. The recorded young, post-Middle-Jurassic age of the Pacific lithosphere (exactly the same as in the other oceans) has also been explained by the exchange of old lithosphere for new. This has to happen in such a way that this supposed exchange has resulted in the same age span of the lithosphere as in the other oceans. In other words – how has it come to be that Pacific lithosphere older than this has not been preserved anywhere?
4. The recorded chronological structure of the north Pacific (Fig. 1), already clear by the end of the 60s, shows that its lithosphere has grown concentrically, similarly to the annual rings of a tree. The simplest explanation of it is that the continents are moving away from the center of the ocean.

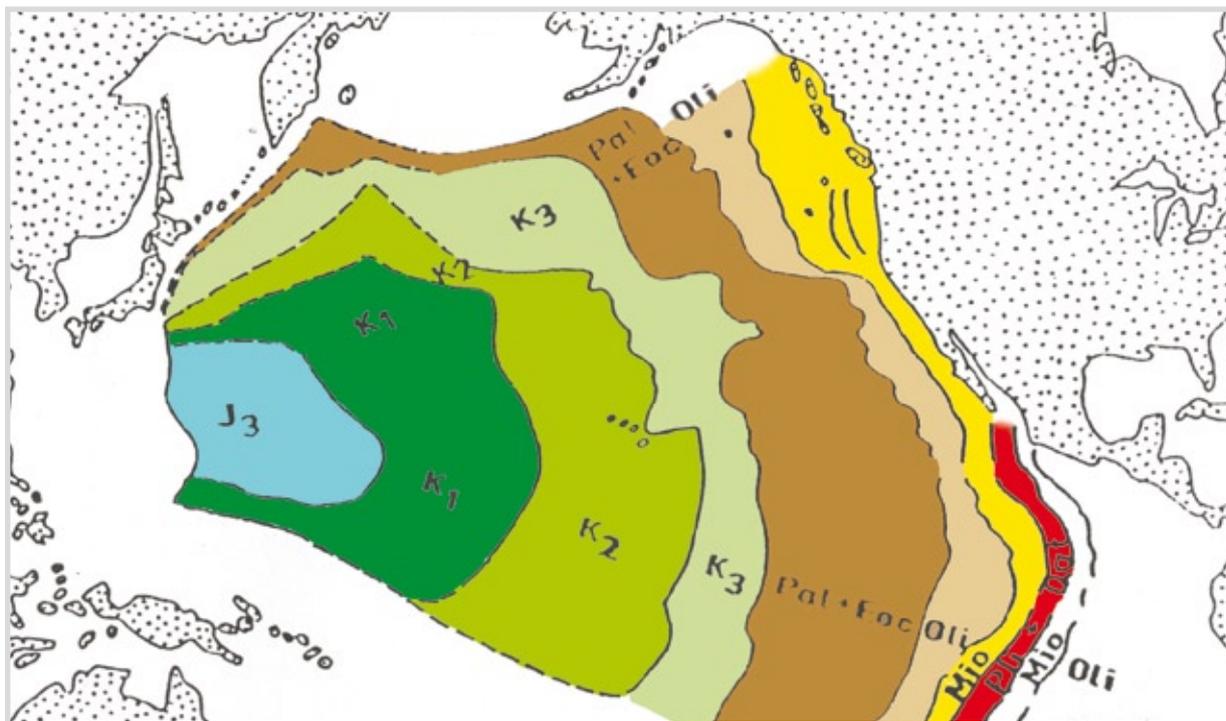


Fig. 1. Growth of the lithosphere of North Pacific
(after: Fisher et al., 1970)

However Wegener's scheme, and afterward the schemes of plate tectonics, require that the continents be moving toward the center of the Pacific. This combined with the above picture of the growth of the Pacific lithosphere, leads to quite unnatural and unlikely reconstructions (Fig. 2) and shortening of the Pacific perimeter.

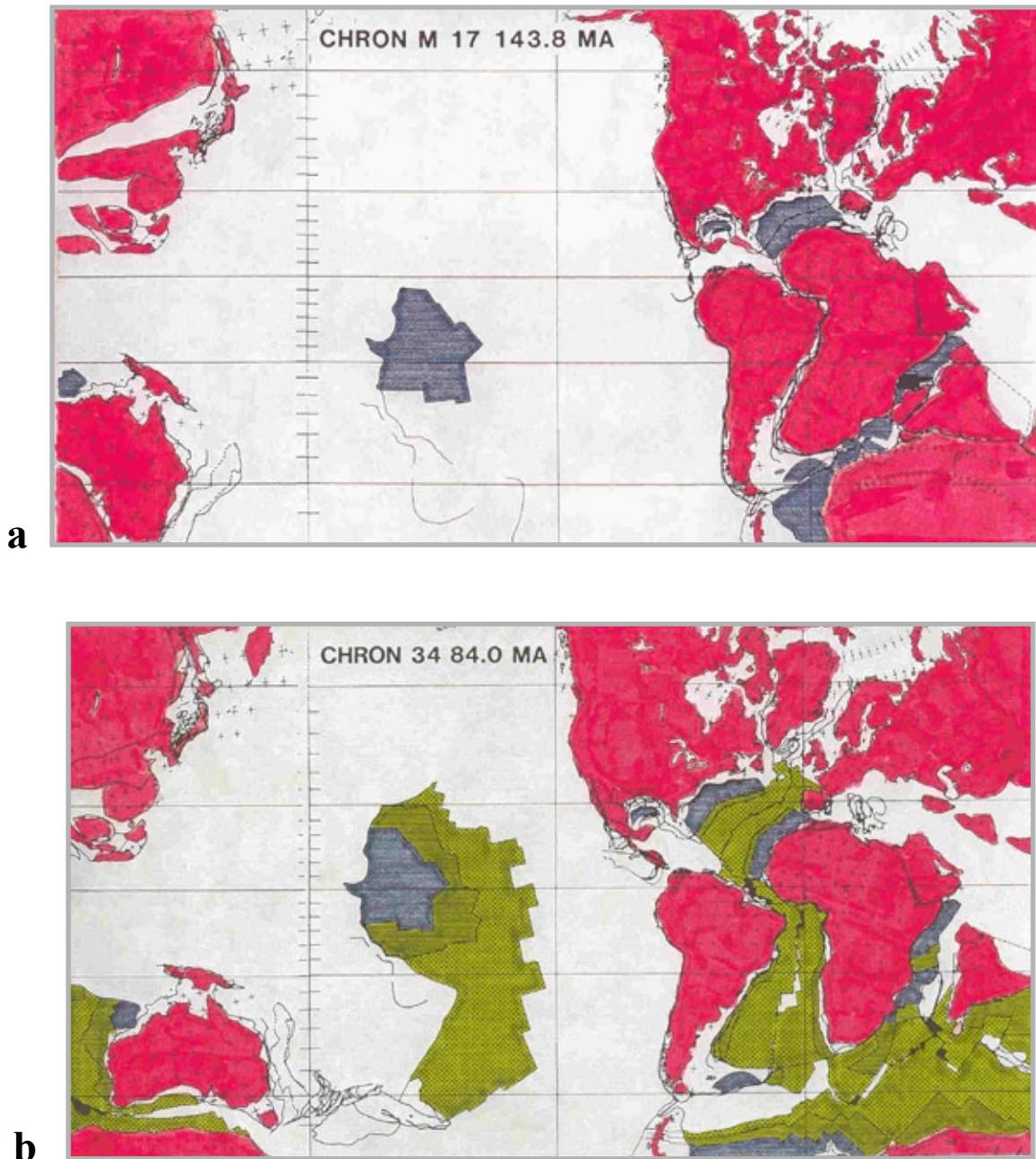


Fig. 2. Development of the Pacific according to plate tectonics

(on the basis of the reconstructions by Scotese et al., 1988). Shifting of the Pacific to the center of the Mercator projection and inscriptions on Fig. 2a added by the present author).

a. Time of turn of Upper Jurassic and Lower Cretaceous

b. Time of turn of Middle and Upper Cretaceous

The continued adoption by plate tectonics of Wegener's scheme of Pacific development makes the real development of this ocean still the crucial test between an expanding Earth and a mobilism which assumes an Earth of constant size. The other global tectonic theories, like fixism and the land-bridges theory have in the meantime been excluded, while the mobilism (spreading) has been proved to be a real process. Thus the development of the Pacific has become a key test for contemporary geotectonics.

7. Carey's test

Carey (1958, 1976) showed that the problem of a change in the Pacific area could be reduced to the problem of a change in the Pacific perimeter. This allows us to abstract from processes within this ocean.

The change in the Pacific perimeter is marked by changes in the width of five labile gaps between continents:

- I. Australian-Antarctic gap
- II. Antarctic-South American gap
- III. Central American gap
- IV. Arctic gap
- V. Asian-Australian gap

All the gaps – as Carey, and after him Meservey (1969), showed – have increased their widths, which proves expansion of the Earth.

Carey's test may be graphically demonstrated as in Fig 3.

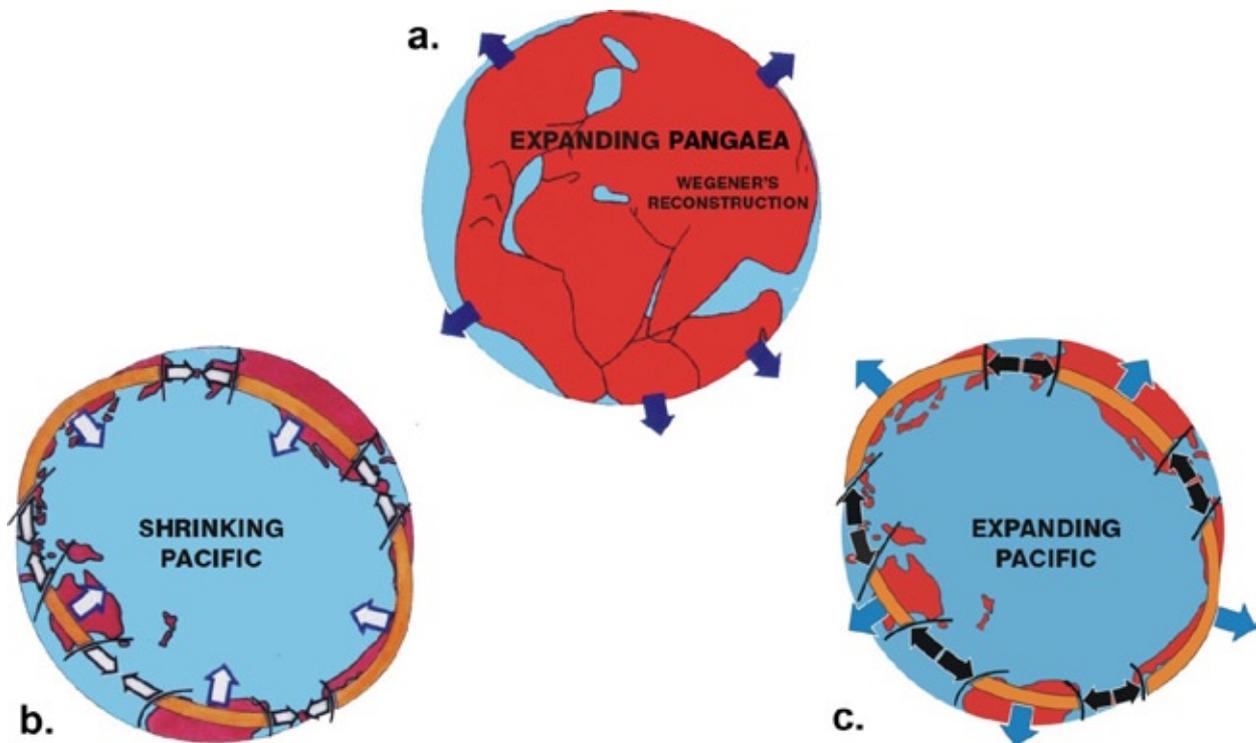


Fig. 3. Carey's test

(graphically elaborated by the present author)

- a. Wegener's Pangaea
- b. Assuming the Earth radius to be constant implies an enlargement of Wegener's Pangaea at the expense of the Pacific (Panthalassa) area and thus a shortening of the perimeter of this ocean.
- c. In reality the Pacific perimeter is growing longer, which means that this ocean is expanding, and which, together with the expansion of Pangaea, means that the Earth itself is expanding

8. Carey's test simplified

Carey's test can be simplified by fitting the most suitable great circle to the circum-Pacific labile gaps, which yields directly an enlargement of Earth's circumference (Fig. 4).

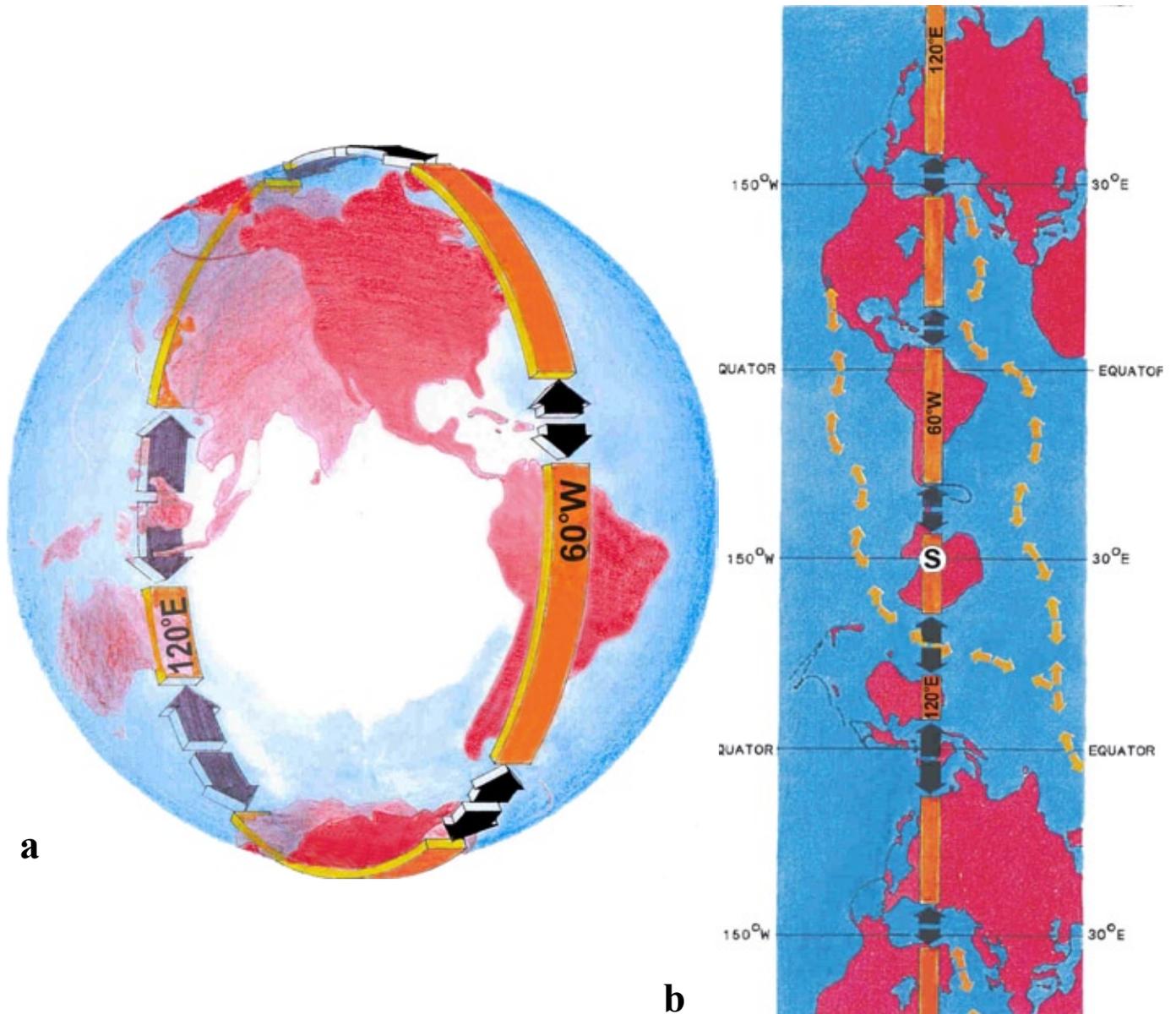


Fig. 4. Carey's test simplified

Enlargement of the Earth's perimeter along the great circle: 60°W - 120°E.

Projecting Pacific perimeter gaps between continents onto the nearest segments of this great circle, reduces the problem of Pacific perimeter changes and of the balance between Pangaea and Panthalassa areas to a change in the Earth's circumference.

a. Three dimensional view

b. Mercator projection along meridians 60°W and 120°E

9. Carey's test strengthened

Because the dilatational development of zones IV and V is questioned within plate tectonics, we can strengthen Carey's test (Koziar, 1985), proving expansion of the Pacific only on the basis of the unquestioned dilatational character of zones I, II and III (Fig. 5).

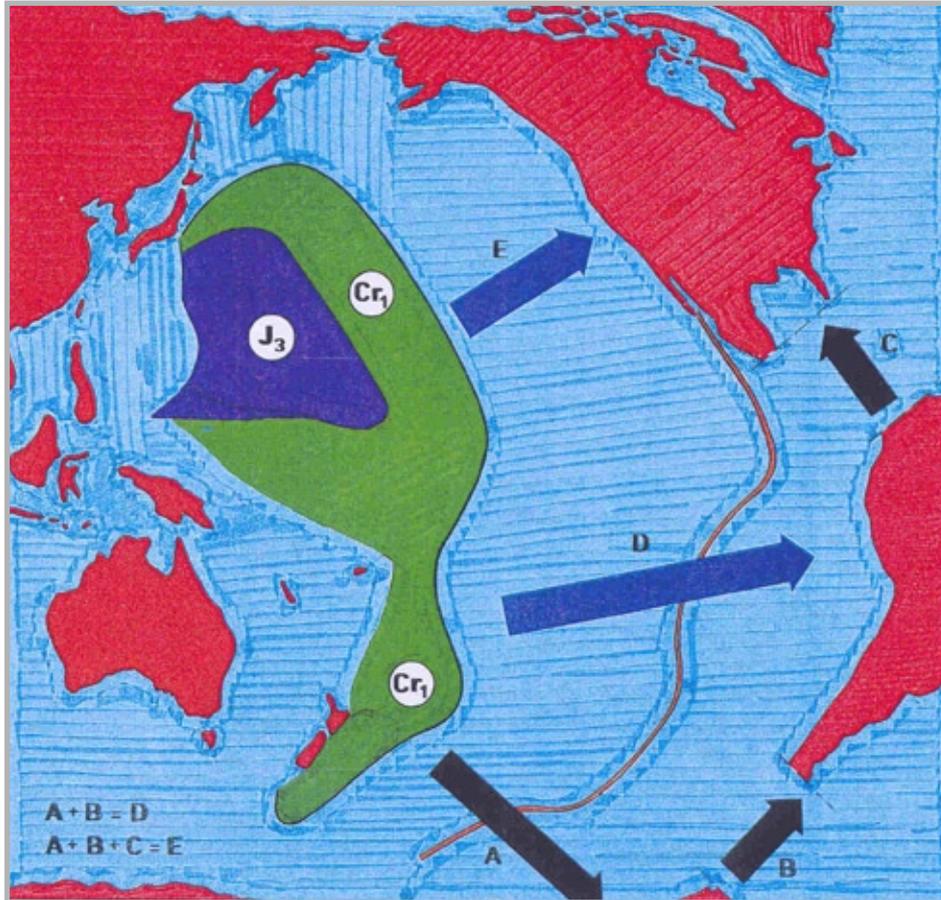


Fig. 5. Carey's test strengthened

The expansion of the Pacific can be proven using the dilatation of only three gaps along its perimeter:

- I. Australian – Antarctic (**A**)
- II. South American – Antarctic (**B**)
- III. Central American (**C**)

Arrows refer to vectors of translation. Black vectors are recorded translations.

Blue vectors are deduced (approximately) as sums of the black vectors: $D = A + B$ and $E = A + B + C$ (or $E = D + C$)

10. Alleged convergent plate movements in Pacific

The result of Carey's test eliminates the alleged process of subduction, introduced to geotectonics on the basis of the proved process of spreading and unproved assumption of constant Earth size. This approach is illustrated by the following quotation:

“These movements [of lithospheric plates] result from the addition of a new crustal material at the crests of the mid-ocean ridges, so that, if the earth is not expanding, there should be other boundaries of crustal blocks along which surface crust is shortened or destroyed” (Le Pichon, 1968, p. 3673).

The subduction hypothesis has been criticized by many authors (Tanner, 1973; Carey, 1976; Krebs, 1975; Chudinov, 1981; Pfeufer, 1981; Wezel, 1986; Strutinsky, 1990) and a tension-gravitational model of island arcs (Koziar and Jamrozik, 1991) has been elaborated.

The subduction hypothesis together with the plate tectonics model of the Pacific development, among other difficulties, is in conflict with the existence of the great sedimentary fans which exist in the northern part of this ocean (Fig. 6).

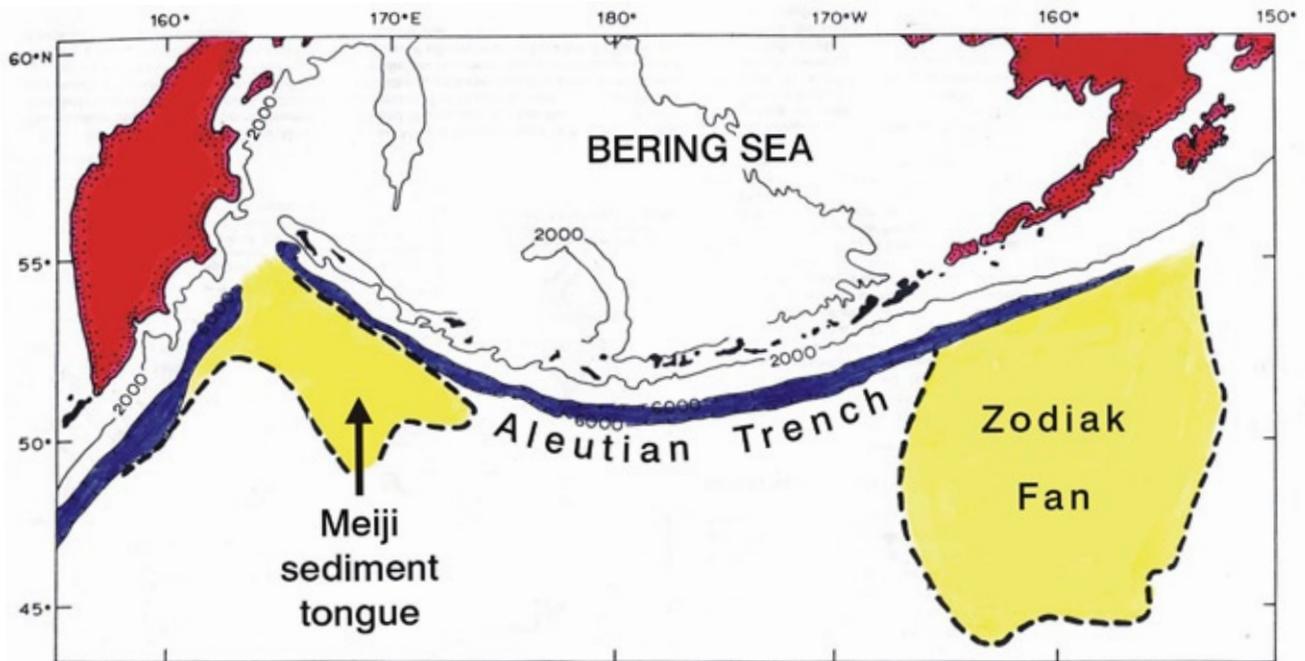


Fig. 6. Zodiac Fan and Meiji Sediment Tongue (after: Scholl et al., 1977 – simplified by the present author). Both structures contradict massive consumption of oceanic lithosphere in the Aleutian Trench

The Zodiac Fan, adjoining Alaska, was formed between 50 and 30 Ma ago. The Meiji Sedimentary Tongue began to form prior to 20 Ma. According to the plate tectonic model (Fig. 2) both structures would have begun to form in oceanic areas far from continent margins, separated from the nearest lands by a wide zone of hypothetical lithosphere which has since disappeared.

This is a most improbable situation.

11. Schematic reconstruction of the growing Pacific

Many expansionists have made reconstructions of the Pacific, either in the frame of the global reconstructions (Hilgenberg, 1933; Barnett, 1962; Creer, 1965; Vogel, 1983; Carey, 1988; Scalera, 1988; 1989; Scalera and Meloni 1991) or as partial reconstructions (Carey, 1983; Shields, 1983; Vogel, 1990; Scalera, 1991). Their common feature is a fitting of contours of the surrounding continents, without considering isochron structure of the Pacific lithosphere.

Below, the present author presents his own reconstruction which has been done, for simplification, on a present-size globe and which utilizes the isochrons of the oceanic lithosphere.

The starting point of the reconstruction is Fig 5. For the turn of the Middle and Upper Cretaceous we obtain the following configuration (Fig. 7a). At the turn of the Jurassic and Lower Cretaceous, the Pacific was at an embryonic stage and was confined to the Upper Jurassic segment of currently existing Pacific lithosphere (Fig 7b).

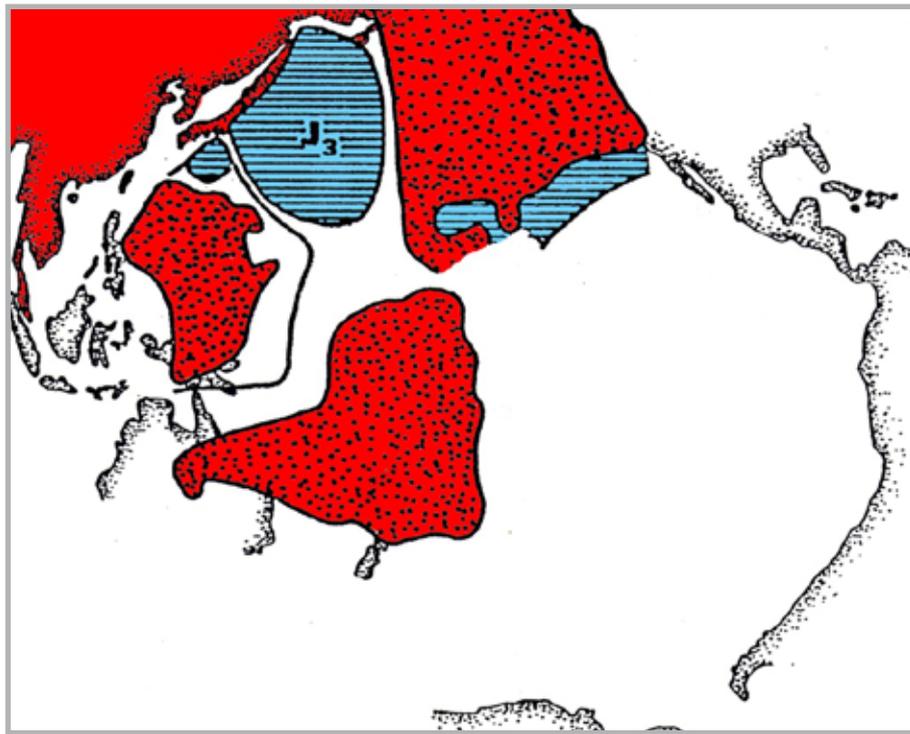
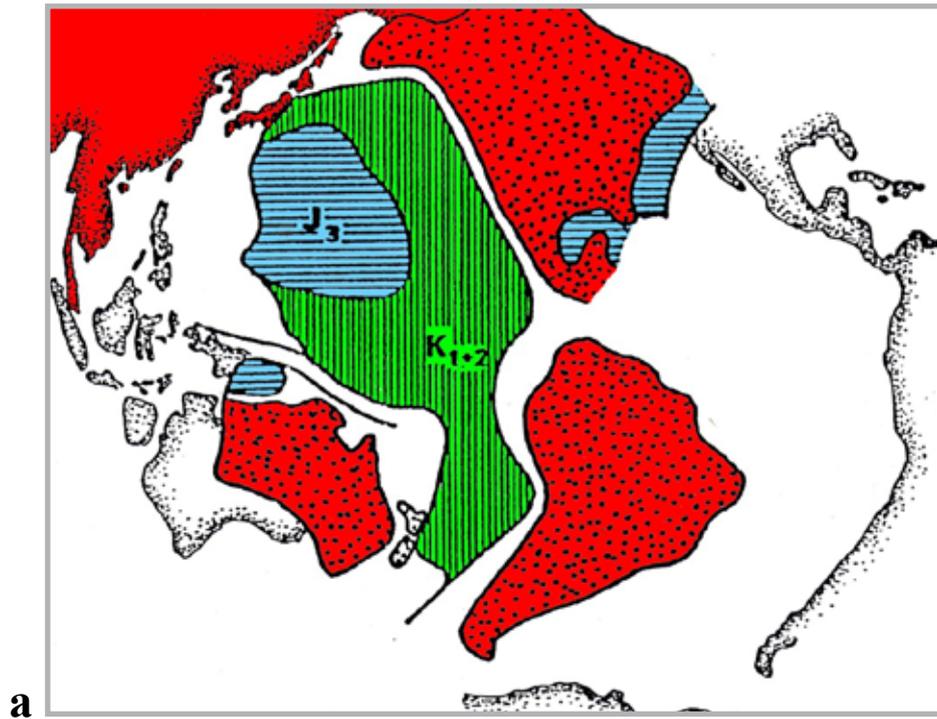


Fig. 7. Schematic reconstruction of the growing Pacific, taking into account its inner plan of development.

The reconstruction is made on the background of the present position of the continents. Asia is treated here as a stationary reference frame,

a – Middle Cretaceous Pacific

b – Upper Jurassic Pacific

12. Contact of Antarctica with India subcontinent

Reconstruction of the Pacific, as presented above, leads to the following combination of Antarctica and India (Fig. 8), which was found earlier by Vogel (1983) - Fig. 9. and in another way by Koziar (1991) on the basis of a new connection of Antarctica and southeast Africa, found by him (Fig. 10).

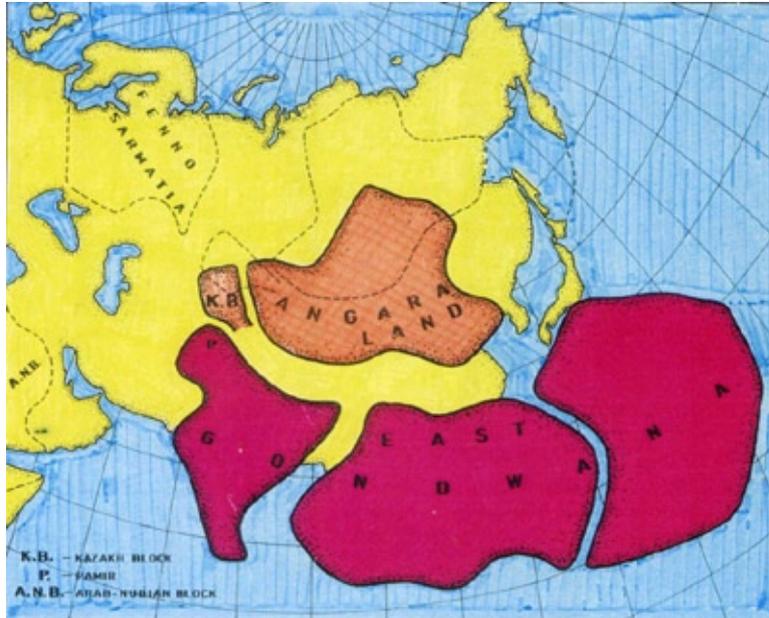


Fig. 8. Contact of Antarctica with India,
resulting from the reconstruction of the Pacific as in Fig. 7b



Fig. 9. Contact of Antarctica with India
according to Vogel's reconstruction (1983).

The radius of the reconstructed globe is here 60% of the present size globe. Reconstruction redrawn by the present author

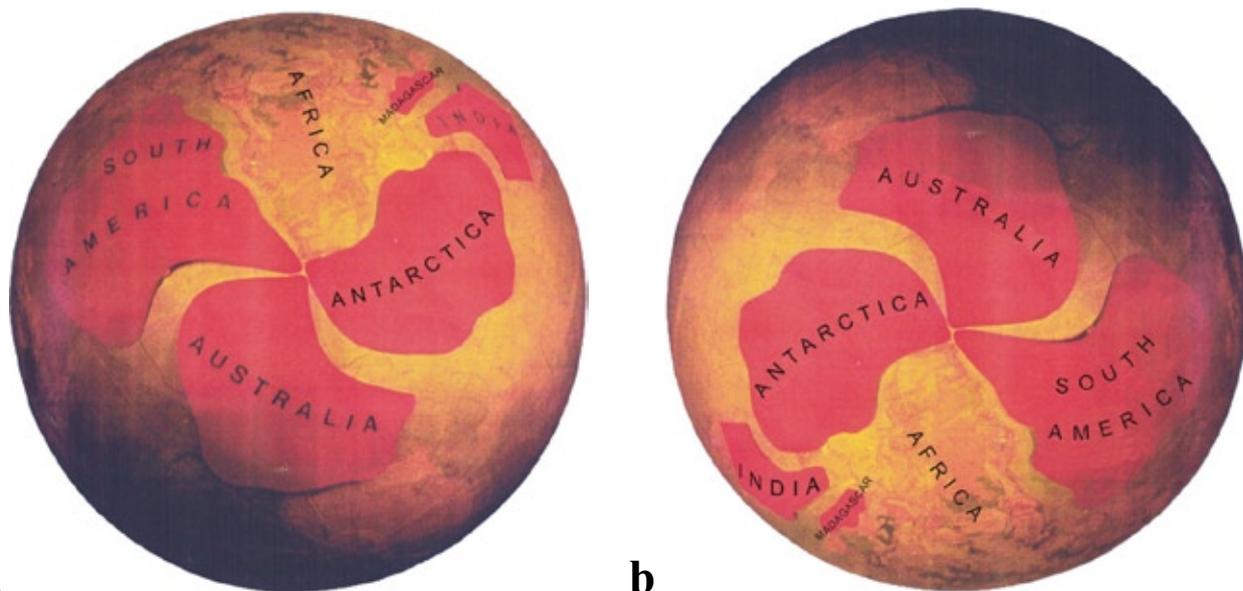


Fig. 10. Combination of Antarctica, Africa and India in the frame of a full reconstruction of the Gondwana supercontinent

(Koziar, 1991; www.wrocgeolab.pl/Gondwana.pdf).

The reconstruction is made on the present size globe with Africa in stationary position. The gaps which are visible between continents result from spherical curvature of the ancient reconstructed lithosphere having been greater than that of a present-size globe (Carey's "gaping gores"; Van Hilten's "orange-peel effect").

a – Conventional position of Africa,

b – Africa's position rotated for better comparison of the whole reconstruction with Vogel's and with Fig. 8

The main difference between the present author's reconstruction and the Vogel's is in the northern position of Madagascar (Somali Basin). The southern position of Madagascar (Mozambique Channel) prevented Vogel from smoothly closing the southern Pacific.

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