HUMBOLDT-STROM, NICHT PERU-STROM !

(HUMBOLDT CURRENT, NOT PERUVIAN CURRENT !)

by

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On the subject of this important ocean current which sets to the North off the western coast of South America, four monographs (1-4) have appeared in recent years, *viz.*, one North American and one French, giving this current exclusively the name of "Humboldt Current", one German and one Norwegian (in English) calling it, on the contrary, "The Peruvian Current". In this connection in 1931 SCHOTT advanced the following arguments :

"In the South American publications this current is nearly always called : "The Humboldt Current" because it was Alexander von HUMBOLDT who supplied the first scientific data respecting it. For us Germans this denomination is indeed very attractive but, since in oceanography all ocean currents are named according to their geographical positions or other natural, impersonal relations, (similar to the abyssal formations in conformity with the international agreements), we shall retain in this study, with O. KRÜMMEL, the expression "Peruvian Current". In addition this current, although it exists along the North Chilean coast, first attains its essential development off the Peruvian coast".

This idea, originating with KRÜMMEL, has been adopted by map-makers in practically all of the German, present-day atlases (5) which, as a rule, designate it exclusively, "Peru-Strom" (Peruvian Current). Is this procedure justified and are the arguments put forward by SCHOTT in support of it conclusive ? A careful investigation of the question shows that :

1. In 1802, Alexander von HUMBOLDT carried out the first scientific measurements in this cold ocean current, the existence of which was already partially known to the Conquistadores, and, on the strength of these measurements, he drew up a picture worthy of admiration, for that epoch, of this extensive current phenomenon, traceable from the "extremity of South America (50° to 55° S.) up to Cape Blanco (4°30' S.).". This monographic description was reproduced in 1837 by H. BERGHAUS, from Humboldt's manuscript, under the title "Memoir über Meeresströme" in the *Allgemeine Länder- und Völkerkunde*" (Vol. I, p. 575 et seq.). HUMBOLDT's genius and the huge progress which his findings, derived from scattered observations, imply for the knowledge of the structure of currents, become evident when we call to mind some paragraphs of his description :

"Just as the existence and the general set of the Gulf Stream were known for centuries before its temperature by European seamen, so the presence of a great ocean current setting from South to North and North-North-West, had been noticed in the Southern Sea since the earliest times of traffic between Chile, Lima and Guayaquil. However, the low temperature of that current and its outstanding influence on the coolness of the coasts, erroneously attributed to the proximity of the snow-clad Cordilleras, were totally unknown on my arrival on the shores of the Southern Sea."

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(1) R. C. MURPHY : The oceanography of the Peruvian littoral with reference to the abundance and distribution of marine life. (Geogr. Review, XIII, *New York* 1923, *p.* 64).

(2) C. VALLAUX : The question of the Humboldt Current. (Hydrographic Review, *published by the International Hydrographic Bureau, Monaco, Vol. VII, No.* 1, *May* 1930, *p.* 66) ; (*appeared also in Spanish in the* Rev. del Consejo Oceanogr. Ibero-Americano 1, 2, *Madrid* 1930).

(3) G. SCHOTT : Der Peru-Strom und seine nördlichen Nachbargebiete in normaler und anormaler Ausbildung. (*Ann. d. Hydrogr.* 1931, *p.* 161).

(4) H. U. SVERDRUP : Some oceanographic results of the *Carnegie's* work in the Pacific. — The Peruvian Current. (*Transactions of the American Geophysical Union, Tenth Annual Meeting, April* 25 *and* 26, 1929... *National Research Council, Washington*, 1930, *p.* 257) ; (*appeared also in* The Hydrographic Review, *Vol. VIII, No.* 1, *May* 1931, *p.* 240).

(5) *The exceptions which have come to my knowledge will be found at the end.*

"The first business of an exploring physicist who, after prolonged absence in mountainous regions, comes down to the seaboard, is to determine the height of the barometer and the temperature of the water. I was occupied with this matter in the area extending from Truxillo to Guaman, near Callao de Lima, and during a sea voyage from Callao to Acapulco, covering a distance in the Pacific Ocean of over one hundred German miles. To my great astonishment I found that the surface temperatures of sea water in latitudes where, outside of the current, it averages 78 ½° to 83° F., showed 61° at Truxillo at the end of September, and 60° at Callao at the beginning of November. The temperature of the air on the first date was 64°, on the second, 73°, *i. e.* (and this is the noteworthy point) 12 ½° higher than the temperature of the ocean within the current. Thus the air could not have cooled the sea and, without a more precise knowledge of the climate of Lima or of the time of the year when the "garua" prevails — i. e. the period during which the sun is veiled by a screen of haze and exhibits for months a yellow-reddish, sharply-defined disc — it occurred to me at once on my first approach to the coast, at Truxillo, that the Peruvian Current is a polar current which, flowing swiftly from higher towards lower latitudes, follows the contours of the coast in a North-North-West trend, an opinion which has since been confirmed by many seamen. The particularly temperate character of the Peruvian coast, I might even say the penetrating cold which is experienced in the midst of the tropics a few feet above sea level in the so-called Baxo-Peru, is due to the low temperature of the sea and the restricted action of the sun beams during the "garua" (screen of haze which covers the sky for three or four months)".

"Each time I was able to observe the temperature in October and November in the neighbourhood of Callao, I found it to be between 60° and 61°; at night it was, at the most, 0.7° colder than in the daytime. In a few rare instances only it dropped for a few hours down to 59° and 58 ½° when (a fact which is characteristic of this usually very quiet part of the Southern Sea and considered by a great many coastal inhabitants to be the result of submarine volcanic disturbance), with the clearest sky and an absolute calm, the surf beating against the granite coast suddenly becomes particularly heavy and thunderous. Undoubtedly this last drop in the temperature to 58 ½° was due to the same cause as that which, in my opinion, cools the water on a sand bank. As a result of the deep-seated convulsions in the ocean, possibly of volcanic origin, the lower layers of the water become mixed with the upper strata, just as when thrown up by shock on a sand-bank, they reach the plateau of a submarine island. (1)"

Thus here already reference is found to certain phenomena of upwelling of the water near the coast, restricted in time and to certain localities, regarding the causes of which nothing definite is known. With regard to the "actual cause, or rather to the starting point of the movement of the water", HUMBOLDT leaves the question open as to whether it should be sought in the Antarctic regions or in the western wind drift in the westernmost part of the ocean. To the concept of the French naval officer DUPERREY. based on the latter mode of thought, HUMBOLDT, at the end of his monograph, makes the pertinent comment (2):

"This concept comprises an immense area of the surface of the ocean, displaces by a distance of some 1300 geographical miles the origin of the Peruvian coastal current, and raises a phenomenon of the southern hemisphere, with which I have long been concerned, to the magnitude of the Gulf Stream or Florida Current in the northern hemisphere, as shown by RENNELL's investigations; and causes its origin to be traced as far back as Needles Bank off the Cape of Good Hope."

If, therefore, the existence of the Chilean-Peruvian coastal current were already known by the Spanish navigators, the fact remains none the less that, in a more general sense, it is Alexander von HUMBOLDT who *must actually be considered its discoverer*, "for which reason" as BERGHAUS (1837) pointed out, "it may also rightfully be called 'Humboldt Current'". Since then, the denomination "Humboldt Current" has been almost generally used in North America and above all in South America (3); it enjoys also preference in French and English literature, whilst, chiefly under Otto KRÜMMEL's influence, it tends to disappear more and more from German literature.

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(1) *According to Berghaus, loc. cit., p.* 575 *et seq.*

(2) *Berghaus, loc. cit., p.* 592.

(3) *Which is also confirmed by an address of the Ibero-American Institute, Berlin, of* 7th *August* 1935 *to the Reich's Ministry for Sciences, Education and Public Instruction, militating in favour of this attitude.*

2. Since about 1880, German geography has departed more and more, for logical reasons, from the former nomenclature, using for the large irregularities in ocean bottom, the names of ships, captains, directors of hydrographic offices, etc., as found on English and French charts and mostly of Anglo-Saxon origin, *known only of a few specialists*, and replaced these *by geographical names* "derived either from the sea concerned or from the neighbouring countries (1)". On the other hand, *even in German literature, out of reverence for the great discoverers, designations long used and connected with names of persons*, such as Baffin Sea, Barents Sea, Weddell Sea and Ross Sea have been retained (2). The same principles should be decisive in the nomenclature of ocean currents. In current charts, nomenclature such as "Mentor Current" and "Rennel Current" have been abolished, not only because it is actually a question of the otherwise wholly unkown Prussian sloop *Mentor* (1823), and of the British oceanographer, major RENNELL, known only by experts, but above all because the water translations "discovered" by them do not exist in the form of independent and continuous currents. On the other hand the name of the great navigator John CABOT (Giovanno CABOTO) survives in "Cabot Current"; in like manner the current south of Iceland is usually called "Irminger Current" (3) in the special German and Scandinavian literature from the name of its discoverer, the Danish admiral IRMINGER (about 1850), *But Alexander von Humboldt is the name honoured throughout the world as the greatest explorer of South America, and German geography by no means transgresses the internationally-admitted principle ; on the contrary it conforms to international usage, by letting the name of the great German scientist survive in the Humboldt Current.*

3. If O. KRÜMMEL prefers the designation "Peruvian Current", another consideration may have been decisive, namely that HUMBOLDT, as regards its main cause, did not give the phenomenon of the Chilean-Peruvian cold water region its true interpretation. For, KRÜMMEL states (4) : "We know that it is explainable by an upwelling of cold bottom waters only, but HUMBOLDT felt inclined to see the source of this low temperature in the higher northern latitudes and thought to be able to trace these Antarctic actions right into the neighbourhood of the Equator". KRÜMMEL, in opposition to HUMBOLDT, ascribes to the "superficial feed of water by an ocean current of polar origin" but very secondary importance, and sees in the upwelling the main cause of the coolness of the masses of water within the current. *However, the most recent explorations of the* Carnegie *prove that Krümmel's views are untenable, that Humboldt observed and interpreted correctly the essentials of the phenomenon and, therefore, discovered it.* Also, having surveyed the results of the Carnegie's stations, SVERDRUP (5) in 1930 reports that :

"The Peruvian Current carries cold water of low salinity along the coasts of Chile and Peru... The low salinity and low temperature of the surface waters off the Peruvian coast has frequently been regarded as evidence of the presence of an upwelling of the deep water. However, in our sections we find no feature which supports this assumption."

The upwelling of bottom water, according to SVERDRUP, is merely a "relatively small-scale phenomenon", receiving confirmation in the immediate neighbourhood of the coast, and which here does none else than bring up to the surface colder water from shallow depths (less than 300 m. !).

4. Finally, the designation : "Peruvian Current" is not propitious either because, properly speaking, it ought to refer to the northernmost portion of the meridionally widely diffused current only (5° to 15° S.) and to the transitional region to the South Equatorial Current, a region where occasionally, it is true, the greatest velocities of the current are experienced. SCHOTT (6), to be sure, erroneously considers the Humboldt Current as a part of the South Equatorial Current when he writes : "In this vicinity of

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(1) A. SUPAN : Die Bodenformen des Weltmeeres. (*Petermanns Mitt.* 1899, *p.* 171).

(2) *Cf. in this respect the writer's article to appear shortly in this journal under the title :* Die Gliederung des Weltmeeres. Ein Versuch einer systematischen geographischen Namengebung.

(3) *Schott's point of view quoted at the outset, and according to which, with regard to oceanography,* "all *ocean currents are named according to their geographical position or any other natural impersonal notion" does not conform to reality.* ("all" *underlined by the writer*).

(4) O. KRÜMMEL : Handbuch der Ozeanographie, *Vol. II, Stuttgart* 1911.

(5) *Loc. cit., p.* 257, 261.

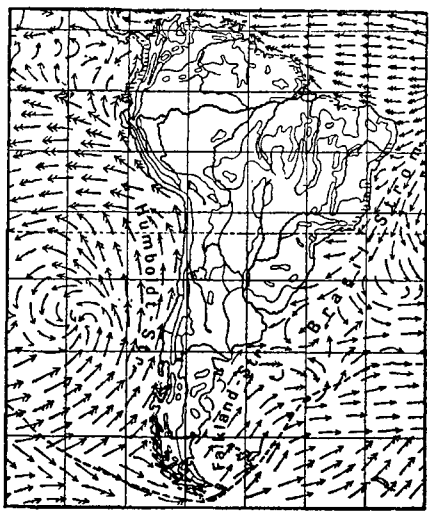
(6) G. SCHOTT : Geographie des Indischen und Stillen Ozeans, *Hamburg* 1935, p. 310.

the South American coast the South Equatorial Current has for long borne the special name of Humboldt Current or Peruvian Current." But, in truth, as we wish to emphasize again, the Humboldt Current is the cold ocean stream flowing chiefly off the coast of Chile, traceable from approx. 50° S. to approx. 5° S., i. e. over approximately 5000 naut. miles, and which, in spite of its often only moderate velocities, is of the greatest importance inasmuch as it determines the oceanographical and meteorological conditions of the Pacific and of the South American climate.

To summarize, *it develops that all the arguments favour the suppression of the name "Peruvian Current" and favour the use, in literature and above all in atlases, of the nomenclature already internationally adopted of "Humboldt Current"*. Already on another occasion (1) the writer has found that in modern literature HUMBOLDT's importance for the knowledge of ocean currents is hardly acknowledged (2), and explains the fact mainly by the lack of charts in which HUMBOLDT recorded his ideas. Let us recall here BERGHAUS's words (3) :

"No impression is so durable as that which acts directly upon our senses; thus it is with graphic representations which lay before our eyes the phenomena of physical geography. They bring to life, in a manner of speaking, that which often remains hidden in the lifeless presentation of the written text."

Therefore, we shall conclude this exposition by a graphical representation, namely, a fragment of the Ocean Currents Chart (See figure) extracted from Sydow-Wagner's methodical school atlas (4), revised by HAACK and LAUTENSACH, which, though in accordance with modern German currents symbols might be improved in some details, compares favourably with those in that it gives the designation : "Humboldt Current".



Note by I. H. B. : It is observed that the First Ibero-American Oceanographic Conference held at Madrid-Malaga in April 1935 passed a resolution adopting the name "Corriente del Perù" (Peruvian Current) to designate the cold current off the coast of South America.

(See : *The Hydrographic Review*, Vol XII, No. 2, Monaco, November 1935, p. 15).

(1) G. WÜST : Der Golfstrom (*Zschr. Ges. Erdk. Berlin* 1930, *p.* 42).

(2) *This is exact also chiefly as regards the discovery of the Humboldt Current. Thus, for example, in G. Schott's "Geographie des Indischen und Stillen Ozeans", Chapter II :* Die Erforschung der Indischen und pazifischen Gewässer (*The exploration of the Indian and Pacific Waters*) *it is no longer question of Humboldt's name and his fundamental discovery ; the author does not even mention his monograph reproduced by Berghaus. He is content later on to name briefly Humboldt when describing the current.*

(3) *Loc. cit. Vol. I, p. VII.*

(4) 20th *Edition, published by Justus Perthes, Gotha* 1932, *Map* 9a. *Lautensach, in his manual for Stieler's "Länderkunde" (Geography) (Gotha* 1926), *has also inserted in the Ocean Currents Map (Map* 41/42) *the term "Humboldt Current". Among present-day school-books, in so far as I have been able to ascertain, it is only in Fischer-Geistbek's "Erdkunde für höhere Lehranstalten" (Geography for higher educational institutions), normal edition, revised by R. Bitterling and Th. Otto, Part III, Munich* 1934, *pp.* 79 & 81, *that it is exclusively spoken of "Humboldt Current".*