PHYSICAL ANTHROPOLOGY OF THE PACIFIC

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Summary

A brief summary of studies in physical anthropology and skeletal biology of the Pacific and Polynesia is presented. Commencing with early studies in physical anthropology in the mid-nineteenth century, which included studies of living as well as prehistoric inhabitants of the Pacific, this survey focuses mainly on two topics: What studies of skeletons from the region have revealed about 1) the initial peopling of the Pacific and the origins of the Polynesians and 2) the health and lifestyle of past Pacific Islanders and Polynesians.

Despite the limited number of studies in the physical anthropology of the Pacific and issues surrounding repatriation, a significant amount of information about the past inhabitants of this region continues to emerge from work involving human skeletons.

1. Introduction

This chapter summarizes previous work in physical anthropology and skeletal biology of the Pacific. Although evidence from other areas in physical anthropology (e.g., genetic and dental studies) is included, the major focus will be what studies of human skeletons and teeth reveal about the origins, health, and lifestyle of the indigenous inhabitants of the Pacific, particularly Polynesians.

After a brief overview of the geography and prehistory of the Pacific, this review summarizes some of the initial observations and descriptive reports in physical
anthropology using human skeletons (primarily crania) from the Pacific collected during the late eighteenth and early nineteenth centuries.

Comparisons of Pacific crania stored in museums soon followed, studies that unfortunately were mired in racial typology. Likewise, the first anthropometric studies of the living inhabitants of the Pacific were initiated in the early decades of the twentieth century. Coinciding with the initial systematic archaeological excavations in the Pacific following World War II, extensive osteological investigations involving prehistoric human skeletons began to appear.

The most recent work in the Pacific focuses on founding populations (e.g., from Vanuatu, New Guinea, and Fiji) and skeletons recovered during archaeological excavation and monitoring activities associated with Cultural Resource Management (CRM) surveys.

Although a great many earlier studies involving skeletons from the Pacific are found in the literature, since the 1990s the possibilities of studying human remains in many parts of the Pacific are now drastically reduced due to culturally sensitive issues surrounding repatriation and the concerns of the indigenous groups. Despite these obstacles, new information about the past inhabitants of the Pacific continues to emerge, albeit not as intensely as in the past.

2. Pacific Islands: Geography, Prehistory, and Linguistics

Although based on an incorrect perception of culture-history, this review will make reference to Dumont d’Urville’s (1832) well known tripartite division of the Pacific: Melanesia, Micronesia, and Polynesia. This review further recognizes the importance of the distinction between Near Oceania (New Guinea, the Bismarck Archipelago, and the Solomon Islands), and Remote Oceania (Micronesia, Vanuatu, Loyalty Islands, New Caledonia, Fiji, and Polynesia) for understanding the prehistory of the Pacific (Green, 1991).

The human occupation of Near Oceania began approximately 40-50,000 years ago (Kirch, 2000). The first humans reached Remote Oceania some time between 3200 and 2800 years BP, an event coupled with an eastward expansion of Austronesian-speaking people and the Lapita Cultural Complex, a cultural horizon identified by its distinctive dentate-stamped pottery, horticulture, and sophisticated navigational skills (Kirch, 2000; Petchey et al., 2010).

Following its immediate origins in the Bismarck Archipelago, approximately 3350 BP, the Lapita culture spread through the Solomon Island chain and other islands in eastern island Melanesia, eventually reaching Tonga and Samoa in western Polynesia (Petchey et al., 2010).

After a pause of approximately one thousand years, these early Pacific navigators went on to inhabit the rest of the islands of Remote Oceania, arriving in some of the more marginal islands in the triangle (e.g., Easter Island, Hawai‘i, and New Zealand) as late as 800 years BP (Hunt and Lipo, 2006). Recently, Hung et al. (2011) suggested that the
first human expansion into Remote Oceania preceded the Lapita expansions by one to two centuries with the colonization of the Mariana Islands in the western Pacific Ocean via the northern Philippines.

Most of the evidence from historical linguistics, archaeology, and physical anthropology indicates that the ultimate origins of these two great colonization events were in Southeast Asia. However, the timing and other details regarding the appearance and dispersal of the Lapita cultural complex believed to be associated with the earliest colonization of Remote Oceania, the focus of this chapter, remain much-debated topics.

Several competing models, based mainly on archaeological, historical, linguistic, and genetic data, have been advanced to explain the exact tempo and mode of the initial colonization of Remote Oceania and Polynesia.

Among these, the so-called “Express Train” model, argues that the ancestors of Polynesians ultimately originated from an expansion of Austronesian-speaking agriculturalists that left Mainland Asia or Taiwan approximately 4000 years ago (Bellwood, 2005).

These Austronesian-speaking people moved rapidly through island Southeast Asia and Near Oceania with little or no genetic admixture with the already indigenous groups they encountered along the way before going on to colonize the rest of Remote Oceania within the last 3000 years.

This expansion is associated with the spread of speakers of the Austronesian language family and the initial development of the Lapita cultural complex in the Bismarck Archipelago.

Other models suggest maritime contacts, some as early as 12,000 years ago (Solheim, 2006), between the peoples of Island Southeast Asia and Melanesians in Near Oceania creating what some have termed spheres of interaction along a “voyaging corridor” as detailed in the “Entangled Bank” model (Irwin, 1992; Terrell et al., 2001; Hurles et al., 2003; Terrell, 2004).

These models suppose a long history of cultural and genetic interactions among the ancestors of Polynesians and the already established inhabitants of Island Southeast Asia and Melanesia.

The “Slow Boat” model, based primarily on Y-chromosome data, is similar to the Express Train model but proposes the ancestors of Polynesians emerged within Island Southeast Asia but then moved slowly eastward into Remote Oceania and Polynesia with significant admixture between them and the peoples of Near Oceania (Richards et al., 1998; Oppenheimer and Richards, 2001a, 2001b).

A more extreme model argues for the indigenous development of the Lapita cultural complex in Near Oceania with no input from outside this region (Allen, 1984). Roger Green’s mobile founding migrant category of models (Green, 1994, 2003) maintains
that there was interaction between the immigrant Austronesian speakers and the indigenous peoples of the Bismarck Archipelago.

Detailed discussions of these and other models are provided elsewhere (e.g., Green, 2003; Matisoo-Smith and Robins, 2004; Pietrusewsky, 2006a; Donohue and Denham, 2010; Petchey et al., 2010).

3. First Impressions/Early Paradigms

The earliest impressions of the indigenous inhabitants of the Pacific are found in writings of explorers, naturalists, missionaries, and other early European visitors to the Pacific that appeared in the late seventeenth and early eighteenth centuries.

3.1. Early Explorers

Johann Reinhold Forster, a naturalist on Captain James Cook's second Pacific voyage (1772-1775) provides one description of Pacific Islanders:

“We chiefly observed two great varieties of people in the South Seas; the one more fair, well limbed, athletic, of a fine size, and kind benevolent temper; the other blacker, their hair just beginning to become woolly and crisp, the body slender and low, and their temper, if possible, more brisk though somewhat mistrustful. The first race inhabits Tahiti, and the Society Islands, the Marquesas, the Friendly Islands, Easter Island, and New Zealand. The second race peoples New Caledonia, Tanna and the New Hebrides, especially Mallicollo” (Forster, 1778: 228).

Similarly, the Cook’s journals described the Maori men of New Zealand as being large and of robust proportions, an attribution that was seen throughout Polynesia (Cook, 1955). Comparable descriptions of the physical characteristics of other Pacific peoples are common in these early texts (Roggeveen, 1970).

3.2. Early Craniology and Printed Catalogs

Following on the heels of the great scientific exploring and collecting expeditions to the Pacific in the early nineteenth century, descriptive studies of skeletons, mainly crania, began to appear (Table 1). One example of these early descriptive reports is William Turner’s (1884) study of crania collected during the voyage of H.M.S. Challenger (1873-76) and other crania that eventually found their way into the osteological collections of the University of Edinburgh. In another report, Emil Zuckerkandl (1875) described crania from various regions of the world including the Pacific, collected during the Austro-Hungarian scientific Novara-Expedition (1857–1859), crania that eventually became part of the Natural History Museum in Vienna.
<table>
<thead>
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<th>Reference</th>
<th>Collection</th>
<th>Polynesian Islands</th>
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<td>Thesaurus Craniorum; private collection in England</td>
<td>Crania from Fiji (10), Society Islands (3), Cook Islands (1), Gambier (1), Marquesas (39), Hawaii (140), New Zealand (14), Chatham Islands (6)</td>
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<td>Cranio metric data from the published literature</td>
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<td>One of the earliest studies to include Polynesian crania in a worldwide comparison using the cranial index</td>
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<td>Jeffries Wyman (1868)</td>
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<td>M. Le Batard (1878)</td>
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<td>Alexander Ecker (1878)</td>
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<tr>
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<tr>
<td>William Henry Flower (1879)</td>
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<td>William Henry Flower (1881)</td>
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<tr>
<td>Rudolf Krause (1881)</td>
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<td>Detailed descriptions of skeletons and crania</td>
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<tr>
<td>Rudolf Virchow (1881)</td>
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<td>Crania from Chuuk, Kiribati and other parts of Micronesia</td>
<td>Detailed discussion of various cranial indices</td>
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<tr>
<td>Jean Louis Armand de Quatrefages (de Bréau) and Ernst Théodore Hamy (1882)</td>
<td>Musée de l'Homme, Paris</td>
<td>Crania from Fiji (12), Tahiti (23), Tuamotu (40), Easter Island (40), Hawaii (22), Marquesas (2), New Zealand (15), and Chatham Islands (3)</td>
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<td>H.M.S. Challenger Expedition (1873-1876)</td>
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<td>Rodolf Krause (1886)</td>
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<td>Augustin Weisbach (1890)</td>
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<td>16 Maori skulls</td>
<td>A comparative craniometric study of Maori and other Pacific crania</td>
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<td>John Halliday Scott (1893)</td>
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<td>83 Maori and 50 Moriori crania</td>
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<td>Collection</td>
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<tr>
<td>Wilhelm Voltz (1895)</td>
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<td>Wynfrid Laurence Henry Duckworth (1900)</td>
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<td>10 crania and 2 skeletons of Moriori from the Chatham Islands</td>
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<td>Howard Slater (1901)</td>
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<td>Adolf Barnard Meyer and Jozsep Jablonowski (1901)</td>
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<td>Wynfrid Laurence Henry Duckworth and A. E. Taylor (1902)</td>
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<td>Heinrich Poll (1903)</td>
<td>Collections in Bremen, Berlin, and Dresden, Germany</td>
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<td>Otto Schlaginhaufen (1906)</td>
<td>Museum of Ethnography, Berlin</td>
<td>Approximately 45 crania and cranial fragments from a limestone caves near Tanapag, Saipan</td>
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<td>Felix Ritter von Luschan (1907)</td>
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<td>Crania from the Society Islands (28), Cook (9), Marquesas (23), New Zealand (53), and Chatham Islands (5)</td>
<td>Detailed study involving metric data</td>
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<td>Theodor Mollison (1908)</td>
<td>Anthropological Institute, Zurich</td>
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<td>Otto Schlaginhaufen (1910a,b)</td>
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<td>Henry G. Chappel (1927)</td>
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<td>Prehistoric Hawaiian skeletons</td>
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<td>Rufus Wood Leigh (1929)</td>
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<td>Skeletons from Guam</td>
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<td>Fredrick Wood-Jones (1931a)</td>
<td>B. P. Bishop Museum, Honolulu, U.S.A</td>
<td>Guam crania</td>
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<td>Fredrick Wood-Jones (1931b)</td>
<td>B. P. Bishop Museum, Honolulu, U.S.A</td>
<td>100 Hawaiian crania</td>
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<td>Felix Von Bonin (1931)</td>
<td>Hunterian Museum of the Royal College of Surgeons, London; Riksmuseum voor Volkerkunde, Leiden; British Museum of Natural History, London</td>
<td>~79 Easter Island crania</td>
<td>Craniology and some non-metric traits; one of first studies to use C.R.L. statistic</td>
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<td>Elizabeth Weber (1934)</td>
<td>Museum für Völkerkunde, Leipzig (formerly in Godeffroy Museum) — material destroyed during WWII</td>
<td>18 (15 males and 3 females) Fijian skeletons</td>
<td>Cranial and infracranial measurements and descriptions</td>
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<td>Helmut Petri (1936)</td>
<td>Natural History Museum, Vienna</td>
<td>16 Easter Island crania</td>
<td>A descriptive, mostly metric, study of Easter Island crania</td>
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<td>Karl Otto Henckel (1939)</td>
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<td>Karl Wagner (1937)</td>
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<td>A detailed craniometric study of Polynesian and other Pacific crania using C.R. L. statistic</td>
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<td>Helga Maria Pacher (1947)</td>
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<td>José Imbelloni (1951)</td>
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<td>Piero Messeri (1956)</td>
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<td>Donald S. Marshall and Charles E. Snow (1956)</td>
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<td>Jane H. Underwood (1969)</td>
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<td>Approximately 97 skeletons from Sand Dune Site (H1), South Point, Hawaii</td>
<td>An osteological report</td>
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</table>

Table 1. Early Studies of Pacific Crania and Skeletons (1846-1965)
Other, early descriptions of human skeletal remains from the Pacific were printed catalogs of anatomical collections in museums and private collections, primarily in Europe, (e.g., Davis, 1867, 1875; Flower, 1879). In addition to offering anatomical material for sale, these catalogs provided information on details of cranial morphology, including some measurements, and unusual anatomical and pathological features present in the collections. Data found in these catalogs, especially measurements, provided the basis for the initial efforts to reconstruct human racial history.

One example of a printed catalog was one written by Joseph Barnard Davis, an English doctor, who provided a comprehensive description of over 1500 crania from around the world acquired during his lifetime (Davis, 1867). In this massive work, Davis devoted several sections of his report describing crania from the Pacific [Hawai`i (N=140), Marquesas (N=30), New Zealand Maori (N=14), and the Loyalty Islands (N=12)], a collection that would eventually become part of holdings of the Natural History Museum in London. In addition to recording measurements for each cranium, Davis provided descriptions of dental pathology, auditory exostoses, tooth ablation, and cranial modification in the skulls from Hawai`i. Davis was also one of the first researchers to attribute the extensive dental wear and dental abscessing observed in New Zealand Maori crania to dietary practices. As was customary for this period, Davis’ interpretations of cranial morphology were based on racial classification.

Likewise, the catalogs of William Henry Flower (1879, 1881), an English comparative anatomist and surgeon, offered detailed descriptions, mainly craniometric, of crania from the Pacific that were then part of the Royal College of Surgeons. Most notably these collections included Polynesian (29 New Zealand Maori) and Fijian (N=33) crania. In his 1881 catalog Flower described 16 crania from the mountainous region of Viti Levu in Fiji and compared them with others from coastal regions of the Fiji Islands. Again, as was typical of this period, Flower’s interpretation of the morphology observed in these skulls rests on the identification of races and racial mixing among the Fijians.

The skeletal collections in Germany and surrounding regions were particularly well described by a series of catalogs published in the early issues of Archiv für Anthropologie, which were part of a large scale project, Die anthropologischen Sammlungen Deutschlands, initiated by Hermann Schaaffhausen (Schaaffhausen, 1878; Ecker, 1878) as well as other similar endeavors (e.g., Krause, 1881; von Luschan, 1907; Schlaginhaufen, 1910a, 1910b). The information provided in these descriptions included age, sex, geographical origin, completeness, and the recording of a standard number of cranial measurements and the notation of any unusual features observed.

Appearing around the same time as these first descriptive studies, were comparative studies of skulls that typically used cranial measurements and indices to compare Polynesian and Micronesian skulls with other groups from around the world (e.g., Uhde, 1861; Retzius, 1864; Pruner-Bey, 1864-1867; Weckler, 1866; Wyman, 1868; Spengel, 1873, 1874, 1876; Le Batard, 1878; Virchow, 1880, 1881; Quatrefages and Hamy, 1882; Krause, 1886; Prochownick, 1887; Weisbach, 1890; Volz, 1895; Allen, 1898; Duckworth, 1900; Slater, 1901; Meyer and Jablonowski, 1901; Duckworth and Taylor, 1902; Schlaginhaufen, 1906; Poll, 1903; Mollison, 1908; Thomson, 1915; Giuffrida-Ruggeri, 1921; Pearson, 1921; Wood-Jones, 1931a, 1931b; von Bonin, 1931).
While most of this initial work involving Pacific crania emanated from Europe, descriptions of Polynesian crania by American physical anthropologists began to appear as well. One anatomist and pioneer anthropologist in the U.S. who examined skeletons from the Pacific was Jeffries Wyman. Wyman was a professor of anatomy at Harvard University and the first curator of Peabody Museum of Archaeology and Ethnology. Wyman described, in great detail, a series of Hawaiian crania from the island of Kaua‘i (Wyman, 1868). His observations included the presence of auditory exostoses, peg-shaped teeth, and other aspects of cranial and dental morphology. Overall, Wyman’s work was novel and introduced an innovative comparative approach that included systematic observation and recording of cranial pathology in the Pacific.

Harrison Allen, another American pioneer in the study of physical anthropology in the Pacific, provided detailed descriptions of 65 Hawaiian skulls from several collections in Philadelphia, Harvard, and Princeton (Allen, 1898). In addition to a detailed summary of metric and nonmetric variation, Allen also made extensive notes on cranial and dental paleopathology.

Unlike his contemporaries who were preoccupied with race and race formation, Allen’s comprehensive study of Hawaiian skulls included an astonishing number of observations of paleopathology, including osteoporosis, periodontal disease, craniosyntosis, external auditory exostoses, linear enamel hypoplasia, etc. By employing a descriptive and comparative methodological approach, Allen was the first investigator to speculate that some of the observed features were the result of nutritional deficiencies, disturbances during growth and development, and/or cultural modification.

The first detailed examination of complete skeletons from the Pacific was made by Halliday Scott, an anatomist and the first Dean of Otago Medical School in Dunedin, New Zealand (Scott, 1893). In addition to detailed descriptions of metric and non-metric variation in 133 Maori and Moriori skulls, Scott included detailed observations of 13 Maori and five Moriori skeletons. In this same report, Scott made observations of dental pathology (e.g., dental caries and dental abscessing) and described features such as rocker jaw and squatting facets in Polynesian skeletons. As was typical of the period, Scott’s interpretations of cranial morphology, which rested on cranial indices, were expressed in terms of racial mixing.
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Biographical Sketch

Michael Pietrusewsky is professor of anthropology at the University of Hawai`i at Mānoa, Honolulu, Hawai`i. He has conducted research on bioarchaeology, skeletal biology, forensic anthropology, and biodistance studies in Australia, Pacific Islands, Southeast Asia, and East Asia.