

48. tcɔbɔdɑ'ɓ stepson, stepdaughter, son or daughter of wife's brother or sister, son or daughter of husband's brother or sister: reciprocal to the two preceding terms
49. tcɔtsɑ'pɑ^{ab} step-grandfather, husband of grandparent's sister
50. tcɔkɑ'yɑ^{ab} step-grandmother, wife of grandparent's brother
51. tcɔle'bɑts^{ab} step-grandchild, grandchild of speaker's wife's (or speaker's husband's) brother or sister: reciprocal to the two preceding terms
52. tsix'we'bɑts husband or wife of grandchild of speaker or speaker's brother or sister; term possibly reciprocal
53. tcɔsxsɑ'xɑ^{ab} son-in-law or daughter-in-law of speaker's wife's brother or sister, husband of speaker's stepdaughter: reciprocally uncle by marriage or stepfather of speaker's wife, etc. kin by marriage; term used in special sense to designate stepbrothers and stepsisters
54. kwe'l^u bi'tigwɑ'l "related through the dead," previously related by marriage
55. tsi'lɔbskay^u persons whose wives are sisters; whose husbands are brothers; whose respective husband and wife are brother and sister: term derived from root syllable q'o', "join"
56. sq'o'idup man whose wife is sister to the wife of another (?); "related through the man"
57. tsi'lɔbsto'bc preceding term amplified
- 57a. tsi'lɔbsto'bc bi'tigwɑ'l woman whose husband is brother to the husband of another (?); "related through the woman"
58. tsi'lɔbslɑ'dai preceding term amplified
- 58a. tsi'lɔbslɑ'dai bi'tigwɑ'l son-in-law related by blood to parent-in-law
59. tɔ'liχ^u sxsɑ'xɑ

AUBURN, WASHINGTON

KNOTLESS NETTING IN AMERICA AND OCEANIA

By D. S. DAVIDSON

THE question of trans-Pacific influences in American cultures has been seriously debated for a number of years. Those who favor a trans-oceanic movement have pointed out many resemblances and several striking similarities between certain culture traits of the New World and Oceania. The theory of a historical relationship between these appearances is based upon the hypothesis that independent invention and convergence in development are not reasonable explanations either for the great number of resemblances or for the certain complexities found in the two areas.

The well-known objections to the trans-Pacific diffusion theory can be summarized as follows:

1. That many of the so-called similarities at best are only resemblances between very simple traits which might be independently invented or discovered.

2. That most of the traits in question are not present among the Polynesians, the great navigators of the Pacific and the only Oceanic people known either to have made great voyages, or to have been equipped in early times with watercraft capable of making extended journeys, but limited to the Australians, Melanesians or Indonesians who are either too poorly equipped with watercraft to have made such excursions or so far removed geographically from America that a trans-Pacific movement, leaving no traces in intermediate areas, would seem most unlikely.

3. That most of the similarities are not concentrated severally either in the Americas or in Oceania but individually are so localized in each region that the diffusion of a large number of traits would entail many independent crossings of the Pacific, a conclusion which seems hardly plausible.

4. That most of the traits involved do not appear on the west coast of the New World, the most likely place for them if brought across the Pacific, but are distributed largely east of the cordillera.

5. That there is no evidence to show that the peoples in the western Pacific who now possess the traits ever reached Polynesia, through which they must have passed if they ventured to the Americas.

6. That the records of the Polynesians do not refer to any visit of peoples passing through their region and that if diffusions took place prior to the arrival of Polynesians, they would have happened at a time when watercraft were hardly developed to the point of successful trans-oceanic navigation.

In spite of these objections, many of which are formidable, it is to be

admitted that many of the resemblances are indeed puzzling, and the chance that some traits may have been carried across the Pacific purposely or inadvertently must be recognized. However, it should be emphasized that the establishing of a trans-Pacific derivation of one trait does not prove that others have had a similar history, nor, vice versa, does the proof that one trait developed in America constitute evidence that the others were also independently invented in the New World.

It is important to note that practically all of the traits listed as examples of a direct historical unity between America and Oceania are perishable or non-material, with the result that archaeology has played but little part in the controversy.¹ This condition is disconcerting to those who are interested in an unbiased appraisal of the situation, although it may be considered as advantageous to the arguments of the extremists of both sides who either find no disproof that certain traits may not have been introduced along the western coast of America where they are now lacking, or no evidence contrary to the supposition that these traits may be but relatively recent independent developments in the American areas they now occupy.

As yet many of the objections to a trans-Pacific route of diffusion, aside from the fact that there is no evidence to show how or when such movements could have happened, have been based upon the supposition that many of the traits could have developed locally in the New World, but very little attention has been given to the evidence in Oceania which may indicate the improbability that certain traits could have been brought to America. It has been more or less tacitly assumed by both sides that the contemporary distributions in the Pacific have been more or less unchanged during the time elapsed since the supposed trans-oceanic diffusions took place, a supposition which seems contrary to logic as well as to the little evidence which is available. Although archaeological material is most fragmentary from Oceania and, in spite of the fact that what we have does not bear upon the problems of the trans-Pacific controversy, there seems to be no doubt but that there has been a constant eastward diffusion of many traits from Indonesia to Melanesia. A few centuries ago, therefore, the eastern boundaries of many of these traits may have been farther west than we observe at present and successively 1000, 1500 or 2000 years ago the distribution may have been much more restricted. Indeed some traits were possibly not in existence in these times. Whether it will ever be possible to come to any satisfactory conclusion as to the antiquity in Oceania of many of the traits concerned in the trans-Pacific controversy

¹ To mention only a few: bark cloth, blow guns, bullroarers, masks, pan-pipes, poison for arrows and for fishing, chewing of narcotics, couvade, etc.

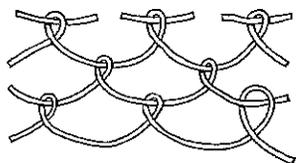
remains to be seen. Certainly the probabilities can be determined in some instances. Investigation into this field may throw important light upon the question of trans-oceanic cultural relationships.

KNOTLESS NETTING

There is one trait which generally has not appeared in the lists of resemblances between the New World and Oceania and that is knotless netting. In the Pacific it is found in most of New Guinea and some of the adjacent islands, is present throughout the eastern half of Australia, occurs in the Gilbert Islands, and similar techniques in stiff basketry are used somewhat differently in Indonesia where they appear to be relatively unimportant. In America, knotless netting is not localized, like many of the parallels to Oceanic traits, but is distributed, with the exception of a few regions, from the habitat of the northernmost Athabascan tribes to Tierra del Fuego. It seems to be prominent along the west coast of South America as well as east of the cordillera and is found archaeologically in pre-Incan graves at Arica. In addition, it is important to note that not only is knotless netting applied primarily to the construction of soft pliable carrying bags in Oceania and the Americas, but also that in the two regions the techniques employed are identical in some cases and very similar in others. On the basis of all factors, ethnological, archaeological, geographical and technological, it would seem that knotless netting lends itself much better to a discussion of the possibilities of trans-Pacific influence in American cultures than do many of the traits usually given as examples of such a movement.

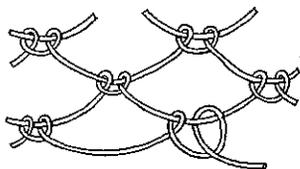
Knotless netting is a subject which has received very little attention in Oceania while in the New World, in spite of its widespread distribution, it has been hardly more than mentioned by a few writers for localized appearances. It is important to note that knotless netting is well suited to the development of many variations in technique. However, in so far as available material indicates, only a few of the possible arrangements seem to have been discovered, or if discovered, accepted by native peoples as patterns to be perpetuated.

Of the techniques observed in Oceania and America there seem to be three basic patterns from which all the others have been derived, and of these three, one, the Simple Loop, is fundamental to the other two. All knotless netting techniques, therefore, seem to be derived from one basic pattern. It is convenient, however, to classify the varieties under the three-fold division of Type I, Simple Loop; Type II, Loop and Twist(s); and Type III, Hourglass. Within this classification, the remaining patterns can be arranged as sub-types and varieties as in the following diagrams.



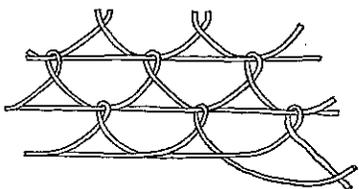
Type I Simple loop

North America,
South America,
Melanesia and
Australia.
(See table 1.)



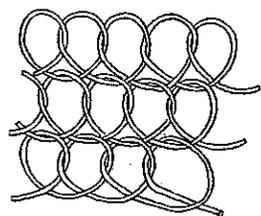
Type I
Variety A Double simple
loop

Gran Chaco
(Ashluslay,
Nordenskiöld,
p. 196, fig. 4c;
Lengua,
Singer).



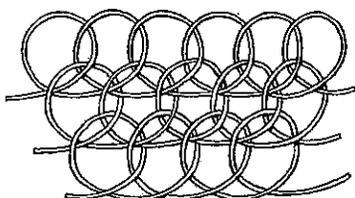
Type I
Variety B Simple loop with
two inter-twining and
alternating strands

Colombia
(Mochila,
Pueblo Viejo).
Singer.



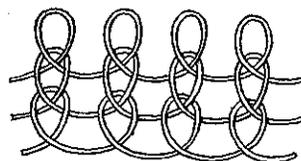
Type I
Sub-type 1
Variety A Simple loop in-
terlocking with
one loop on all
sides

Ecuador and
northeastern
Peru
(Yahua R.
and mouth of
Napo R.).
Singer.



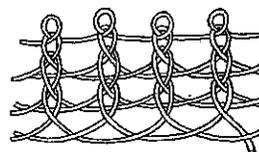
Type I
Sub-type 1
Variety B Simple loop in-
terlocking with
each adjacent
loop of its own
row and with
two loops of the
adjacent rows

Nakanai district
New Guinea.
Graebner.



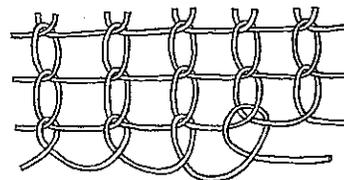
Type I
Sub-type 2
Variety A Half-hitch
around half-
hitch

East coast of
Dutch New
Guinea to
Finschhafen.
Graebner.



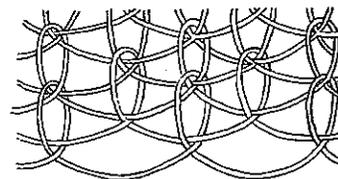
Type I
Sub-type 2
Variety B Half-hitch
around half-
hitch with two
alternating and
intertwining
strands (used in
belts)

Northeastern
Brazil
(Patamon
and Makusi).
Roth, p. 440.



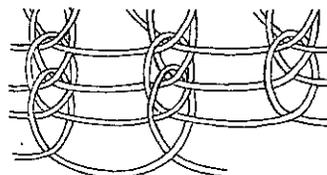
Type I
Sub-type 3
Variety A Half-hitch
through half-
hitch

Costa Rica
(Bribri,
Valiente?).
Skinner, pl. 5.



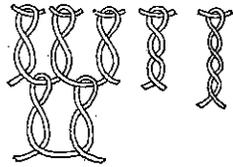
Type I
Sub-type 3
Variety B Half-hitch
through half-
hitch with two
alternating and
intertwining
strands

Costa Rica
(Bribri).
Skinner, pl. 7;
North coast of
New Guinea
and New Britain
(Baining
tribe).
Graebner.

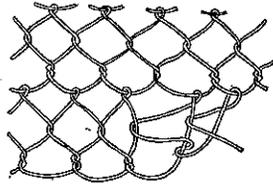


Type I
Sub-type 3
Variety C Half-hitch
through the
half-hitches of
two adjacent
rows

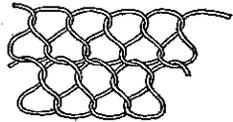
Costa Rica
(Bribri).
Skinner, pl.
11.



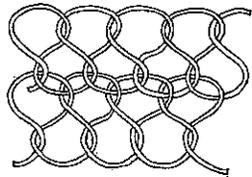
Type II Loop and twist(s)
North America, South America, New Guinea and Australia.
(See table 1.)



Type II Sub-type 1 Simple loop interlocking with adjacent loops on each side, thence with a double twist about itself
Venezuela.
Singer.

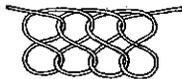


Type III Hourglass pattern
North America, South America, Melanesia, Australia.
(See table 2.)

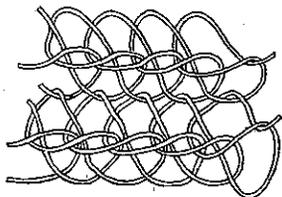


Type III Variety A Hourglass interlocking with two loops of each adjacent row
New Guinea.
Graebner.

Note: There is an error in the accompanying figure. The working strand should be brought forward through both loops of the preceding row rather than through only one loop.



Type III Sub-type 1 Figure of eight
Maya of southern and central Honduras.
Thompson, pl. 11.



Type III Sub-type 2 Hourglass with lower loop interlocking with two adjacent loops to the right
Gran Chaco (Lengua and Charoti), Northeastern Peru (Yahua R.).
Singer.

TABLE 1. SIMPLE LOOP AND LOOP AND TWIST TECHNIQUES

Bags unless otherwise indicated

	<i>Simple loop</i>	<i>Loop and twist</i>	
NORTH AMERICA NORTH OF CENTRAL MEXICO			
Northern Maidu (caps)	x	x	Dixon, 1905, p. 144.
Karuk		x	Harrington, J. P., pl. 11b.
Hupa	x		Goddard, pl. 6.
Pima and Papago (carrying frames)	x	x	Mason, 1902, pp. 248, 294; Kissell, p. 227, fig. 78.
Kodiak Island (gamebags)	x		Mason, 1887, pp. 210-11.
Mackenzie (muskemoots and hunting bags)	x	x	Mason, 1902, p. 249.
Dogribs (babiche wallets)	x		Mason, 1902, p. 379.
Huichol, and Tarahumare (?) (pack net and netted shield of a game)	x		Lumboltz, I: 240 (?); II: 87, 203.
*Ozark Bluff Dwellers	x		Harrington, M. R., p. 11.
*Hopewell Mounds	x	x	Mason, 1902, p. 380.
*Brewster Co. Rock Shelter, Texas	x	x	Coffin, p. 41.
*Val Verde Co., Texas	x	x	Pearce and Jackson, p. 93.
*Shumla Caves, Big Bend Area, Texas	x	x	Martin, pp. 48-49.
*Basket Maker II and III	x		Guernsey and Kidder, 1921, p. 65; Guernsey, p. 116.
*Prehistoric Pueblos I and II (?), III, IV (bags, gaming wheels, sandals, leggings, caps)	x		Kidder and Guernsey, 1919, fig. 45, pls. 34b, 46c; Guernsey, p. 116.
Montagnais-Naskapi (except in far north where hare is lacking)†	x		Dr F. G. Speck.
Têtes de Boule, Grand Lake Victoria†	x		Fieldnotes.
Eastern Cree†	x		Dr J. M. Cooper, and Miss Regina Flannery.
Eastern Cree and Northern Saulteaux†	x		Skinner, 1911, p. 35.
Saulteaux and Cree†	x		Dr A. I. Hallowell.
Slavey, † Bush Cree of Medow Lake, and Bungi (blankets)	x		Museum of the American Indian.

* Archaeological evidence.

† Blankets and garments.

	<i>Simple loop</i>	<i>Loop and twist</i>	
Hare, Satudene, Dogrib, Kutchin, Slavey and possibly all other northern Athabascans (blankets)			Dr C. B. Osgood; Osgood, 1933, p. 58; MS.

SOUTHERN MEXICO AND CENTRAL AMERICA

Miskito, Twahka, Panamaka, Ulwa and neighbors (Honduras and Nicaragua)	x		Conzemius, p. 52.
Bribri (Costa Rica) and Valiente (?)	x		Skinner, p. 6, pl. 8.
Common throughout Central America	x		Mason, 1887, p. 210.

SOUTH AMERICA

*Ica (Ocucaje)	x		O'Neale and Kroeber, p. 53, pl. 6, b.
*Arica (single and double twists)	x	x	Uhle, pp. 6, 9, 12, 32, pl. 25, 1; pl. 8, fig. 2.
*Atacama Desert (woolen hat)	x		Singer.
Jivaro	x		Kreiger, pl. 36.
Pachacamac	x		Schmidt, p. 546.
Tucano of Uaupes R. (scoop-net), Lengua, Xingu area (Kalapalu, Kuluene R. also masks), Goajira, Mochela and Santa Maria (Colombia), Venezuela	x		Singer.
Chaco, Ashluslay, Choroti, Mataco, Northwestern Brazil (Rio Negro and Rio Yapura), Botocudo, Guayaki, Ijca, Kögga, Motilone, Araucanians, Jivaro, Oldest graves at Arica*	x		Nordenskiöld, 1919, pp. 195-202.
Western tributaries of the Rio Negro	x		Van Gennep.
Arawak, Uaupes R. (fish-net)	x		Roth, pp. 198-99, 321, pl. 48, fig. 61.
Brazil, Chiriqui	x		Mason, 1894, p. 487; 1902, p. 532 and pl. 129.
Yahgan, Alacaluf, Chono (basket style)	x		Lothrop, pp. 133-34.
Alacaluf, Chono, Onas; also Araucanians but lacking among Tehuelche	x		Cooper, 1917, p. 204; 1925, pp. 412, 416.
Patagonia, Peru, Tierra del Fuego	x		Mason, 1889, pp. 210-11.
Goajira (Colombia) (single twist)		x	Singer.
Maracaibo (Venezuela) (single twist)		x	Singer.
Fundacion, Columbia (open saddle bag)		x	Singer.

	<i>Simple loop</i>	<i>Loop and twist</i>	
with some rows of four twists, some of three twists)			
Santa Marta, Colombia (basket-like objects, with double or triple twists)		x	Singer.
OCEANIA			
Australia: Queensland, New South Wales, Victoria, South Australia, Central Australia, North Australia	x		Davidson, p. 260.
Australia: Queensland, New South Wales, Victoria, eastern South Australia		x	<i>Ibid.</i> , p. 263.
New Guinea: Strickland R., Geelvink Bay, Goodenough Bay and hinterland, Dutch New Guinea	x		Graebner, pp. 26 <i>et seq.</i> , Davidson, p. 260.
New Guinea: Fly R., Papuan Gulf and Strickland R.		x	Davidson, p. 263.
Gilbert Islands		x	Graebner, p. 26.

TABLE 2. HOURGLASS PATTERN

Bags unless otherwise indicated

Mayas of Southern and Central British Honduras		Thompson, pl. 11.
Ashluslay, Choroti, Huari, Mataco, Tapiete, Toba, Tsirakua		Nordenskiöld, pp. 200-201; Radin, p. 938.
Ronuro tribe (Xingu area), Chaco, Chamacoco, Lengua, Mbaya. Similar (?) technique, coast of Peru (Nat. Museum, Stockholm)		Nordenskiöld, pp. 202.
Said to be lacking among Yuracare, Chimane, Guarayu, Chama, Absahuaco, Chacobo, Huanyani, Chiriguano, Chane, Araucanians, Karaja, Caingua, northwestern Brazil, Roraima country, Jivaro, Botocudo		<i>Ibid.</i> , pp. 239-40.
Huari, Bakairi and neighbors		<i>Ibid.</i> , pp. 239-40.
Choroti, Mataco, Misiones, Lengua, Kajabi (Xingu), Tupi (locality?), Mundurucu (hoop-bag), Cayapa (money pouch), French Guiana, Angayti (Paraguay-hammock), Chamacoco (also masks and hammocks), Motilone, Lengua, Guiana.		Singer.
New Guinea: Eilander R., Astrolabe Bay, Huon Gulf, Finschhafen, Collingswood Bay, Cloudy		Graebner, p. 26 <i>et seq.</i> ; Davidson, p. 265.

Bay, Redscar Bay, Ope R., Geelvink Bay to northeastern New Guinea, Papuan Gulf to Massim area.

New Britain (Baining tribe)

Graebner, *op. cit.*

Now a glance at the list seems sufficient to indicate that many of the patterns are unique and localized and, therefore, have no basis for comparison with appearances in other regions. Unless it will be necessary to revise this compilation when additional material becomes available, it would seem permissible to exclude from further consideration the following techniques which are found only in restricted distributions in America or in Oceania.

Type I	Variety A	Gran Chaco area
Type I	Variety B	Colombia
Type II	Sub-type 1	Venezuela
Type III	Variety A	North coast of New Guinea
Type III	Sub-type 1	British Honduras
Type III	Sub-type 2	Gran Chaco

Of the remaining varieties and sub-types there are a number which show trans-oceanic similarities but which are not identical. These include:

Type I, Sub-type 1. In this group there are two varieties, one found in South America, the other in Oceania. The former, Variety A, consists of a simple loop which interlocks with each adjacent loop in its own row and with one loop in each adjacent upper and lower row. Variety B differs only in that it interlocks with two loops instead of with one loop of the adjacent upper and lower rows. Variety A is the simpler but is not necessarily an intermediate step between the basic Simple Loop and Variety B. Granted the presence of the Simple Loop, it would seem to be an easy matter to invent either variety independently. Independent development is also indicated by their distributions. Variety A has been found only in a small area in northeastern Peru and eastern Ecuador, east of the cordillera. Variety B seems to be restricted to the Nakanai area of New Guinea. In view of the direct relationship of each to the Simple Loop, and of their localized distributions, it seems reasonable to believe that the two similar patterns are relatively recent in origin and that they have resulted from independent parallel developments from the Simple Loop within the two localities where found. Indeed, even if it will be found that both varieties are made in the two regions the theory of parallel development, to my mind, would still be the only reasonable explanation for such simple processes.

Type I, Sub-type 2. In this group there are also two varieties, A and B, the former found from the east coast of Dutch New Guinea to Finschhafen,

where it is used in bags; the latter in the Patamon-Makusi area of northeastern Amazonia, where it is employed in the manufacture of belts. Aside from the fact that in South America two alternating strands are used, the two techniques are identical in that half-hitches are taken about the half-hitches of the preceding row. Technologically, it seems rather obvious that this technique is a direct variant of the Simple Loop as well as one which might easily occur independently. The localized distributions of these two varieties would seem to indicate another example of recent parallel developments in South America and Oceania.

Type I, Sub-type 3. Sub-type 3 differs from Sub-type 2 in that the half-hitches or bights are taken through the half-hitches of the preceding row rather than around them.

In this group there are three varieties, A, B, and C, all of which are found among the Bribri of Costa Rica, but of which only B has been reported in Melanesia, where it is present along the north coast of New Guinea and among the Baining tribe of New Britain.

The most simple in appearance is Variety A which has been reported only for Costa Rica. Its relationship to and its derivation from the Simple Loop can be plainly seen. Variety C, also limited to Costa Rica, in so far as we know, seems obviously a development from Variety A. The principle of construction is the same except that the working strand is taken through the half-hitches of two adjacent rows rather than through the half-hitch of only one row.

Variety B differs from Variety A in that two alternating strands are employed to the effect that a half-hitch is taken (1) through the half-hitch of the previous row of the same strand and (2) about each pendant loop of the two adjacent rows of the alternate strand.

In spite of the fact that this technique is the same in both New Guinea and Costa Rica, there seems to be no reason for suspecting historical relationship between these two appearances. In the latter region, both B and C appear as likely derivatives from A, which in turn, it cannot be doubted, is only a slight alteration of the Simple Loop.

In Oceania, it is quite possible that B may represent a direct variation of A, although it would not be surprising to learn that A is also in use or was formerly present. In view of the restricted distribution of this technique in the two areas, further support is given the contention that convergence or parallel development is responsible for these appearances.

ALTERNATING STRANDS

The use of two alternating strands is another elaboration which is common to both Oceania and America. In the former region, it has been

reported from the north coast of New Guinea and nearby New Britain (Type I, Sub-type 3, Variety B). In America it is found in Costa Rica (I, 3, B), Colombia (I, B), and northeastern Brazil (I, 2, B). It is possible that these American appearances may be continuous in distribution and that the custom of using alternating strands has had but one origin in the New World. Such a possibility is by no means certain, however, for what we have spoken of as two alternating strands may actually be or originally may have been either two separate strands or only one strand which alternates the points of attachment as it spirals row by row. It is quite possible, therefore, for this trait to have originated in one of two different ways and to have been instigated by a variety of causes: experimentation, accident, or repair. There seems to be no reason for regarding the appearances of the use of alternating strands in the New World and Oceania as indicating historical continuity. The process is simple and apparently might occur quite naturally to knotless netters.

THE BASIC PATTERNS

We have now to consider the three basic techniques, the Simple Loop (Type I), the Loop and Twist (Type II), and the Hourglass pattern (Type III). All are found in Oceania and in America and the patterns of their construction are identical. As we have already seen, each seems to have given rise independently to certain variants in both regions. It is to these basic patterns, therefore, that we should look for any possible historical relationship between the knotless netting of the two regions.

Type III. The Hourglass pattern, it seems clear from a technological point of view, is based upon the Loop and Twist technique (Type II). In Oceania such a derivation is indicated geographically in the Australian distributions.² In the New World, however, the contemporary distributions, in so far as we have data, do not show this derivation so obviously. The Loop and Twist pattern occurs in several places north of Mexico and in Colombia and Venezuela, but we have no information concerning its presence in Central America or in other parts of contemporary South America. Archaeologically, however, there is material to show the relative ages of the two patterns, for the Loop and Twist technique has been recovered from a number of ancient deposits in North and South America, whereas the Hourglass technique appears only in existing cultures. At Arica, the nearest archaeological site to the contemporary appearances of the Hourglass pattern, both the Simple Loop and the Loop and Twist techniques occur in sufficient quantities to leave no doubt but that the

² Davidson, p. 266.

Hourglass pattern was not made at the time these pre-Incan deposits accumulated. The suspicion that the Hourglass technique may be not more than several hundred years old on the west coast of South America would seem, therefore, to have some foundation, although we are in need of additional archaeological data from other regions.

In Oceania, on the other hand, we have no stratified remains but the chronology of (1) Simple Loop, (2) Loop and Twist, and (3) Hourglass patterns appears to be established on distributional grounds as well as by technological considerations. There can be no doubt but that the Hourglass technique is the most recent of the three, but its actual age cannot be even approximately given.

In view of what seems to be a very recent appearance in western South America and a relatively recent beginning in Oceania, it would seem that the appearances of the Hourglass pattern in the two areas cannot be historically related. It would be hardly possible for influences to have emanated from one area to the other within the past millennium or 1500 years without leaving traces in other areas or without some record being incorporated in the traditions of some people between South America and Melanesia.

However, we have no right to assume that the Hourglass technique has occupied the same distribution in New Guinea during the past centuries as that noted today. Graebner has pointed out some indications of its eastward diffusion in New Guinea and there can be no doubt but that it has been carried to Australia on the south and to New Britain on the north.³ It appears never to have reached other regions east of New Guinea.

It is quite possible that the point of origin for the Hourglass technique in Oceania is not in New Guinea, for we find the same pattern appearing occasionally as a single row in the stiff basketry in Indonesia.⁴ It is impossible at present to affirm or deny the possible relationship between this appearance and the similar pattern in knotless netting, but the chance that the technique may have arisen in Indonesia must be recognized. Whether the origin was in western New Guinea or in Indonesia it will be seen that a diffusion toward America has been in process, but that only a beginning had been made and that several thousands of miles of ocean are still intervening.

In the New World no direction of diffusion has been determined. The technique is widely distributed from British Honduras to the Xingu-Gran Chaco area with appearances also in the Guianas and in Ecuador. The

³ Graebner, p. 29; Davidson, pp. 268, 299.

⁴ Lehmann, p. 191.

most intensive use at present seems to be in the Xingu-Gran Chaco region and it is possible that the few occurrences west of the Andes may have diffused from that region.

We cannot be reasonably certain that there has been only one development of the Hourglass pattern in America, for the appearance in British Honduras seems to be quite isolated from Ecuador and the Guianas, the nearest known other places where this technique now occurs. Knotless netting techniques, however, are poorly known for Central America and it is possible that the Hourglass pattern may come to light in the intermediate areas. In addition, we must not overlook the possibility that Arawak or Carib influences may be responsible for the Honduran appearance.

With a relatively slight antiquity for the Hourglass pattern suggested for both New Guinea and South America there would seem to be no reasonable basis for believing that this technique is not indigenous to both regions. Certainly there is no evidence to indicate that a trans-Pacific diffusion could be responsible. Technologically, there is no need for a diffusion theory, for a Loop and Twist basis, found in both areas, seems sufficient to explain the parallel development. On the basis of our conclusions the similarity of zigzag ornamentation appearing upon the bags of the north coast of New Guinea and those of the Gran Chaco, for which Graebner has implied a historical relationship,⁵ must be regarded as fortuitous.

Type II. The Loop and Twist technique, obviously a slight variation of the Simple Loop, appears in widely separated areas in the New World, particularly in North America. So far it has not been reported for Central America, while in South America its contemporary use seems to be confined to Colombia and Venezuela. It would not be surprising, however, to find that such a simple technique is much more widespread than present evidence indicates.

Archaeologically we have seen that it occurred at Arica in South America. In North America a much greater antiquity has been determined by the finding of fragments in the Hopewell Mounds and in cave remains at Shumla Cave and in Brewster County, Texas. Since these latter remains show similarities to Basket Maker culture, a considerable antiquity is indicated.

It is possible that all these ancient appearances have diffused from a common point of origin, but it seems much more likely, in view of the simplicity of this technique and the different manners of its use, that it has been discovered in a number of places. For instance, in the Mackenzie

⁵ Graebner, p. 29.

basin and among the Pima, its use seems to be more or less decorative, to relieve the otherwise monotonous series of rows of simple loops. In Colombia the peculiarities of saddle bags seem to have encouraged the development of multiple twists. In other areas it seems to have been the sole technique in a bag, as in Australia and New Guinea. It is impossible to comment upon the ancient uses since, for the most part, only fragments are available.

In the Pacific, the Loop and Twist technique is found in Australia and New Guinea and appears to have developed in the latter region, or possibly in some unknown area farther west. All facts indicate that it diffused to Australia prior to the diffusion of the Hourglass pattern to that region. In the Oceanic specimens, this technique, when used, is consistently employed throughout one bag.

We have no evidence to indicate the antiquity of the Loop and Twist technique in the Pacific. The most we can say is that it appears to have preceded the Hourglass pattern and to have developed from the Simple Loop. Presumably, however, there has been an eastward diffusion in New Guinea which never passed farther than the eastern part of the island.

From the Pacific point of view, therefore, there seems to be no indication that this technique could have diffused to America. From the American point of view we may feel quite certain that there could have been no trans-Pacific navigation early enough to have introduced this technique to the ancient cultures of Texas. Furthermore, the Simple Loop is known to have been used as early as Basket Maker II and with this background there is no need for any derivation of the Loop and Twist technique from some non-American area. Although a more or less continuous distribution would seem to indicate a unitary origin for the Loop and Twist technique in Oceania, it seems quite possible that there may have been a number of independent developments in America.

Type I. The Simple Loop, as seems clear, is the foundation for all the varieties of knotless netting considered. In Oceania, it occupies the most widespread distribution, being found throughout eastern Australia, in the regions occupied by the Loop and Twist and the Hourglass patterns, as well as in areas peripheral to them; in a large but sporadic distribution in New Guinea and also in the Gilbert Islands. There are no indications of antiquity in these regions since no archaeological remains have been discovered. However, the distributions support the theory that this basic technique has given rise to the more complex forms, and also indicate that this oldest pattern, in reaching the Gilbert Islands, has been carried farther east than any of the later varieties. Such a distribution is consistent with the material we have already surveyed which showed that knotless netting

has been in the process of invading the western Pacific and that the directions it has followed, if toward America, are only accidentally so.

In the New World, the Simple Loop is also the most widespread. Among living peoples, it is sporadically distributed from Alaska to Fuegia. Archaeologically it appears at Arica in South America and in the various deposits in North America as early as Basket Maker II.

The appearance of knotless netting in Basket Maker deposits is a fact of prime importance to our discussion, for there can be no doubt but that trans-oceanic navigation was impossible in such early times, as well as possibly for some millennia following, depending on the date finally given this culture.

There would seem to be no possibility, therefore, that there can be any trans-Pacific relationship between the appearances of the Simple Loop in America and Oceania. Indeed, knotless netting may not have been known in the Pacific at the time Basket Maker II was a living culture in North America. With the Simple Loop in use in both areas, there seems to be no reason why the different varieties could not have followed independently through processes of parallel development.

It is possible, however, that the appearances of the Simple Loop in the two areas may be historically related by way of the Asiatic continent. The influences which Asia has had upon the surrounding regions in both ethnic strains and culture are well known and it seems more than possible that knotless netting, in the form of the Simple Loop, may have been carried by migrants or diffused at an early time from group to group, on the one hand to America and on the other, to Indonesia, thence to Melanesia. Indeed these influences may have spread also in other directions, for we find the Simple Loop also employed by the Lapps⁶ and by numerous tribes in Africa.⁷ A more detailed study of these appearances must be made before a theory of a unitary origin for all the occurrences of the Simple Loop can be reasonably upheld, but the peripheral appearances of this basic technique support the probability that it may have originated in Asia to diffuse to America by way of Bering Strait, and to Melanesia via Indonesia.

CONCLUSIONS

Our survey of knotless netting in the New World and in the Pacific would seem to indicate again that caution must be exercised in arriving at

⁶ Bag in the Buffalo Museum of Natural History.

⁷ Thomas, 1924, Mongbettu shield slings; Van Rippen, pp. 90-91, Uintjes food bag of Bushmen; Hall, p. 99, fig. 36, Bapende bodice; Van Gennep, Wangoni of southeastern Africa; Lehmann, 1907, pp. 19 *et seq.*, Middle Nile, Bakuba, Bali, Haussa, Ekoi, etc.

conclusions of trans-Pacific influence in American cultures. At first glance, the numerous complexities in the knotless netting of the two areas appeared to indicate that some trans-oceanic connection was not only plausible but necessary to explain the identical appearances. Although the facts from the historic cultures of the two regions would seem to be sufficient to dispel such a theory, the most convincing evidence has been furnished by archaeology. We cannot help believing, therefore, but that were it possible to obtain some knowledge of the prehistory of other traits involved in the trans-Pacific controversy, many of them might also be found to be independently developed in the two areas or historically related during very early times via the Asiatic continent. At the same time, it must be fairly admitted that other traits may have been brought across the Pacific. Each trait should be judged on its own merits and not in accordance with some pre-conceived theory that all similarities in America and Oceania are the results either of convergence on the one hand or of trans-Pacific diffusions on the other.

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BOOK REVIEWS

NORTH AND SOUTH AMERICA

Warpath. The True Story of the Fighting Sioux. Told in a Biography of Chief White Bull. STANLEY VESTAL. (xv, 291 pp., 9 pls., 3 maps. \$3.00. Boston and New York: Houghton, Mifflin Co., 1934.)

Naturally stressing martial life, this biography adds interesting points to our knowledge of the subject, such as details on Western Dakota honor heraldry (pp. 24, 186), military technique including decoy tactics (pp. 56 ff., 118), and the history of a Bullet-proof society (pp. 131-144). The close contacts of the several Western Dakota chiefs is clearly brought out. The hero himself was the son of a Minniconjou chief and a cross-nephew of Sitting-bull of the Hunkpapa, and in the course of his life he belonged to societies of both tribes and of the Sans Arc (pp. vii, 26). Apart from warfare, there are several references to visions (e.g., pp. 12 seq., 93, 109, 250), to the heyoka (pp. 13, 261 f.), a shamanistic contest (p. 94), and the Sun Dance (pp. 95, 137), performers of which are said to have used headscratches (p. 95). A prayer to game animals in times of famine is noteworthy (p. 111), and the account of a buffalo scout's report (p. 234 f.) deserves mention. White Bull's fifteen marriages exemplify patrilocality (pp. 88, 215), the fragility of the bond (pp. 103, 124), the tribulations due to jealousy in a polygynous household (pp. 125 ff., 213, 216), and the throwing away of wives at the Grass Dance (p. 215). An incipient trend to hereditary aristocracy is seen to mingle with the principle that merit rests in personal achievement (p. 120). Swimming is described as "dog-fashion or overhand" (p. 7), and the Crow are credited with using the bull-roarer to frighten horses (p. 107).

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The Hidatsa Earthlodge. GILBERT L. WILSON (BELLA WEITZNER, editor). (Anthropological Papers, American Museum of Natural History, Vol. 33, Part 5. 80 pp., 45 figs. \$1.00. New York, 1934.)

All students of Plains ethnology are familiar with the late Gilbert L. Wilson's accounts of particular phases of Hidatsa culture and will welcome this addition to the series. It is a matter of deep regret that Dr Wilson's death will prevent the bringing together of the wealth of material which he had gathered into a single complete study of this tribe. The present work maintains the high standard of the earlier reports. It is unquestionably the most complete account of the plan, construction and internal arrangement of earth lodges which has so far been published. It also contains a unique account of the founding of a new village, the marking out of the site, and the selection of places for lodges and the construction of the village stockade. The work will be of interest not only to ethnologists but to all archaeologists working in regions where earth lodges and village fortifications are found.

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