UNIVERSITY OF CALIFORNIA PUBLICATIONS
IN
AMERICAN ARCHAEOLOGY AND ETHNOLOGY
Vol. 10, No. 1, pp. 1-12 May 18, 1911

PHONETIC CONSTITUENTS OF THE NATIVE LANGUAGES OF CALIFORNIA

BY
A. L. KROEBER

BERKELEY
THE UNIVERSITY PRESS

UNIVERSITY OF CALIFORNIA PUBLICATIONS

DEPARTMENT OF ANTHROPOLOGY

The following publications dealing with archaeological and ethnological subjects issued under the direction of the Department of Anthropology are sent in exchange for the publications of anthropological departments and museums, and for journals devoted to general anthropology or to archaeology and ethnology. They are for sale at the prices stated, which include postage or express charges. Exchanges should be directed to The Exchange Department, University Library, Berkeley, California, U. S. A. All orders and remittances should be addressed to the University Press.

		Price
Vol. 1.	1. Life and Culture of the Hupa, by Pliny Earle Goddard. Pp. 1-88; plates 1-30. September, 1903	$1.25
	2. Hupa Texts, by Pliny Earle Goddard. Pp. 89-368. March, 1904 Index, pp. 369-378.	3.00
Vol. 2.	1. The Exploration of the Potter Creek Cave, by William J. Sinclair. Pp. 1-27; plates 1-14. April, 1904	.40
	2. The Languages of the Coast of California South of San Francisco, by A. L. Kroeber. Pp. 29-80, with a map. June, 1904	.60
	3. Types of Indian Culture in California, by A. L. Kroeber. Pp. 81-103. June, 1904	.25
	4. Basket Designs of the Indians of Northwestern California, by A. L. Kroeber. Pp. 105-164; plates 15-21. January, 1905	.75
	5. The Yokuts Language of South Central California, by A. L. Kroeber. Pp. 165-377. January, 1907 Index, pp. 379-393.	2.25
Vol. 3.	The Morphology of the Hupa Language, by Pliny Earle Goddard. 344 pp. June, 1905	3.50
Vol. 4.	1. The Earliest Historical Relations between Mexico and Japan, from original documents preserved in Spain and Japan, by Zelia Nuttall. Pp. 1-47. April, 1906	.50
	2. Contribution to the Physical Anthropology of California, based on collections in the Department of Anthropology of the University of California, and in the U. S. National Museum, by Ales Hrdlicka. Pp. 49-64, with 5 tables; plates 1-10, and map. June, 1906	.75
	3. The Shoshonean Dialects of California, by A. L. Kroeber. Pp. 65-166. February, 1907	1.50
	4. Indian Myths from South Central California, by A. L. Kroeber. Pp. 167-250. May, 1907	.75
	5. The Washo Language of East Central California and Nevada, by A. L. Kroeber. Pp. 251-318. September, 1907	.75
	6. The Religion of the Indians of California, by A. L. Kroeber. Pp. 319-356. September, 1907 Index, pp. 357-374.	.50
Vol. 5.	1. The Phonology of the Hupa Language; Part I, The Individual Sounds, by Pliny Earle Goddard. Pp. 1-20, plates 1-8. March, 1907	.35
	2. Navaho Myths, Prayers and Songs, with Texts and Translations, by Washington Matthews, edited by Pliny Earle Goddard. Pp. 21-63. September, 1907	.75
	3. Kato Texts, by Pliny Earle Goddard. Pp. 65-238, plate 9. December, 1909	2.50
	4. The Material Culture of the Klamath Lake and Modoc Indians of Northeastern California and Southern Oregon, by S. A. Barrett. Pp. 239-292, plates 10-25. June, 1910	.75
	5. The Chimariko Indians and Language, by Roland B. Dixon. Pp. 293-380. August, 1910 Index, pp. 381-384.	1.00
Vol. 6.	1. The Ethno-Geography of the Pomo and Neighboring Indians, by Samuel Alfred Barrett. Pp. 1-332, maps 1-2. February, 1908	3.25
	2. The Geography and Dialects of the Miwok Indians, by Samuel Alfred Barrett. Pp. 333-368, map 3.	
	3. On the Evidence of the Occupation of Certain Regions by the Miwok Indians, by A. L. Kroeber. Pp. 369-380. Nos. 2 and 3 in one cover. February, 1908 Index, pp. 381-400.	.50
Vol. 7.	1. The Emeryville Shellmound, by Max Uhle. Pp. 1-106, plates 1-12, with 38 text figures. June, 1907	1.25
	2. Recent Investigations bearing upon the Question of the Occurrence of Neocene Man in the Auriferous Gravels of California, by William J. Sinclair. Pp. 107-130, plates 13-14. February, 1908	.35
	3. Pomo Indian Basketry, by S. A. Barrett. Pp. 133-306, plates 15-30, 231 text figures. December, 1908	1.75
	4. Shellmounds of the San Francisco Bay Region, by N. C. Nelson. Pp. 309-356, plates 32-34. December, 1909	.50
	5. The Ellis Landing Shellmound, by N. C. Nelson. Pp. 357-426, plates 36-50. April, 1910 Index, pp. 427-441.	.75

UNIVERSITY OF CALIFORNIA PUBLICATIONS
IN
AMERICAN ARCHAEOLOGY AND ETHNOLOGY

Vol. 10, No. 1, pp. 1-12 May 18, 1911

PHONETIC CONSTITUENTS OF THE NATIVE LANGUAGES OF CALIFORNIA

BY

A. L. KROEBER.

Until recently but little exact attention was paid to the sounds of American Indian languages. Some of the most valuable grammatical study has been conducted in spite of an uncertain phonetic basis. A large part of the linguistic investigations made have been carried on by men primarily ethnologists, many of whom had their training in biological or other sciences remote from linguistics. Of late, however, the principles and methods of phonetic research established by European scholars have begun to be applied to American Indian languages, largely through the entrance into this field of several students trained in the study of Indo-European philology. The consequence has been so gratifying, that, while work of this nature is still in its infancy so far as native American speech as a whole is concerned, it is already worth while to discuss certain results.

The aboriginal languages of California are those with which the writer is most familiar. Careful phonetic examinations of several of these idioms have been made by Dr. P. E. Goddard, Dr. E. Sapir, and Mr. T. T. Waterman, and aural observations are available for others by several authors. Since the number of unrelated languages in the area is large, there is opportunity to establish principles and tendencies common to diverse tongues. Conclusions arrived at may therefore be of use in the phonetic study of languages not yet examined, especially in the Californian

field, but also elsewhere, and may serve to enlighten the fundamental problem whether the linguistic families of America possess any underlying or general features peculiar to themselves as a class.

In vowels, open qualities prevail markedly over close in the languages of California. This is certain in practically every instance for e and o, and in most cases for i and u. The Athabascan dialects and Yana are the only ones for which any observer who has given definite attention to this point reports close sounds, and in Yana these are only i and u. So far as Yurok, Yuki, Wintun, Yokuts, Salinan, Yuman Mohave, and the Shoshonean dialects are concerned, e, o, i, and u are all invariably open. E and o are open also in Karok, Chimariko, Pomo, Maidu, Miwok, Costanoan, Washo, and probably in Wiyot, Shasta, and Chumash. In most of these languages i and u have also been heard as open, but it is possible that their close qualities may occur in addition. It is usually more difficult to distinguish close and open i or u than close and open e or o.

This practical uniformity in regard to vowel qualities raises the question whether a similar tendency may not be characteristic of North American languages in general. The descriptions ordinarily given of Indian vowels, as of u "like English oo" or by the orthography ū, are no evidence, unless emanating from a recorder having the distinction of quality clearly in mind. An English or German speaking person inevitably assumes all long vowels to be close unless he deliberately checks his unconscious impulse to perceive as he is accustomed to speak. The inaccuracy has frequently been perpetrated in California, not to the least extent by the present writer; and yet, greater care reveals the presence of scarcely any close vowel qualities; so that a sceptical attitude seems justified as regards many other American languages.

It is hardly necessary to add that a tendency for length to be associated with closeness and brevity with openness, or the reverse, has not been established in a single instance.

The predominance of open vowels accords well with the general reluctance toward lip movements frequently ascribed to the

North American Indians and observable among those of California. Rounding of the lips is particularly lax.

Greater breath or aspiration in vowels than is customary in European languages is present in certain cases in Hupa, Kato, and Yana, in the opinion of Dr. Goddard and Dr. Sapir, and always in northern Paiute according to Mr. Waterman.[1] The author has found that the vowels of Mohave, Luiseño, and Papago are quite uniformly spoken with stronger breath than are the vowels of European languages. Other observations are not at hand, but it seems likely that these instances also are only examples of a widely spread or even universal tendency. It is possible that the "laryngeal intonation" sometimes ascribed to American languages generally, is to be interpreted as consisting of this phenomenon.

The typically Shoshonean vowels ö and ü have been found in four other Californian families, Maidu, Miwok, Yokuts, and Chumash. The fact has been noted that these languages are all in immediate geographical contact with Shoshonean, and have therefore apparently borrowed the sounds from that family. Mr. Waterman has found, however, that northern Paiute possesses in reality only one sound, written by him ü, which is easily apperceived as either ü or ö. The same conclusion was reached by the author in regard to Papago, of the so-called Piman family, but actually related genetically to Shoshonean. On the other hand another Shoshonean dialect, Luiseño, distinctly shows both ö and ü in a few instances, though in general the sounds have been lost. In Yokuts also both occur, ü being related to ö in the system of vocalic harmony characterizing Yokuts in the same way as i is to e, and u to o. Maidu seems to agree with Yokuts, but in Miwok and Chumash the author's writing of ü and ö has been so inconsistent as to force the suspicion that they may be one vowel. A tolerable degree of acquaintance with a language seems prere-

[1] This account was prepared after the completion of a study of the phonetics of the Northern Paiute language by Mr. T. T. Waterman. In the course of circumstances attending printing, the writer's paper is appearing first, but it is only just to acknowledge that without Mr. Waterman's previous examination of Paiute, as well as his study of Salinan, there would not have been sufficient exact material extant on several points to have made their present comparative discussion possible.

quisite to decide the question, as both sounds are strange to Indo-European ears and mechanical experiments hardly feasible. In all cases, however, the vowel or two vowels are produced with less rounding of the lips than in German or French close or open ö or ü; and the general method of formation seems to involve the tongue in position for u, the lips for i, or the inverse of the position for forming ü familiar to Europeans. The "impure" *u* and *o* that have been written in some of the above languages are probably only ü and ö, or open u and o.

Nasalized vowels, familiar from Siouan, are rare in California. As easily recognizable organically distinct sounds they seem to occur only in certain Yuki dialects. Some tendency toward nasalization has been noted in Athabascan and Salinan. The vocalic interjection meaning yes is however often more or less nasal, even in languages that appear to possess no nasalizing impulse in the vowels of formal parts of speech.

Frequently associated with vowels are glottal stops. These have been ascertained to occur in Hupa, Kato, Yurok, Wiyot, Yuki, Yana, Wintun, Maidu, Miwok, Yokuts, Salinan, the Paiute and Luiseño dialects of Shoshonean, and Yuman Mohave. They probably occur also in Chimariko, Shasta, Pomo, Washo, Costanoan, and Chumash. No language in California is as yet known to be without them, a circumstance that accords with their apparently normal occurrence throughout the continent.

In Yurok and probably some other languages, glottal stops which follow a vowel produce a more or less distinct echo or reverberation of the vowel after the release of the glottis; in Mohave and northern Paiute this is not the case.

Stopped or plosive consonants accompanied by glottal closure are for the most part easily recognized and have long been known in American languages. Their nature has however generally not been clearly understood by Americanists. Experiment as well as observation have shown that instead of being strongly stressed, that is, vigorously aspirated, they lack aspiration almost entirely. Some students have even thought of inspiration or suction. It is true that these sounds are produced with distinctly greater muscular pressure for the closure, and probably with greater violence of muscular release, than ordinary stops, so that the

name "fortes" is not inappropriate; but vigorous articulation of course is not the same as vigorous expulsion of the breath. The essential characteristic of the class seems to be that the impulse toward closure of the mouth by the lips or tongue is accompanied by a synchronous impulse toward general contraction of the muscles used in speech, at least as far down as the glottis; so that the occlusion by the lips or tongue for p, t, or k is paralleled by an occlusion by the glottis. One would expect that the impulse for release would also be simultaneous for mouth and glottis; but this seems doubtful. Some inquirers claim to observe a perceptible interval between the release of the tongue or lips and that of the throat; and the proved lack of aspiration seems to corroborate this opinion. The interval is however certainly very brief; and it is difficult to understand the frequency and readiness with which such a delicate correlation, as releasing one organ of speech the merest small fraction of a second before another, is produced, if this succession is necessary to the production of the sound. Certainly the acquirement of the ability to make these stops is not difficult even to one who has not used them before. It is possible, however, that the impulses to close and to release are contemporaneous for mouth and throat, but that the glottis lags a little behind the lips or tongue in both instances. At the closing this would have no special effect; but at the release it would permit of the lack of aspiration, or even suction, on which most students are agreed. In any event, the most correct designation of the group seems to be "stops with accompanying glottal stop," and the most appropriate orthography the symbols for the unvoiced stops of the same articulation with a superposed glottal stop. This orthography is however typographically difficult; so that a stop followed by a glottal stop is perhaps the most successful approximation ordinarily available. The point of exclamation after the stop expresses the "fortis" or muscularly pressed quality, but fails to render the all-important glottal action, and is open to cavil on the ground that to most Europeans it would suggest increased force of breath rather than the true quality of the sounds.

Stops with glottal closure have been found in Athabascan, Yurok, Chimariko, Yuki, Wintun, Yana, Maidu, Yokuts, and

Salinan. They probably occur also in Wiyot, Shasta, Washo, Pomo, and Chumash. They are lacking in Karok, Costanoan, Miwok, and in all Shoshonean and Yuman dialects as yet examined. Wherever found in California, they are produced with but moderate stress of articulation; the corresponding sounds in the languages of the Pacific Coast farther north certainly possess the "fortis" quality to a much more marked degree.

The "fortes" affricatives tš, ts, and t*l* also occur. It would seem that the entire combination of stop and continuant is in these cases accompanied by glottal closure, the throat not being opened until after the completion of the continuant š, s, or *l*. This would indicate that the release of the glottis has no direct connection with the release of the tongue, and is further evidence that the opening of mouth and throat in the pure stop "fortes" is not simultaneous. It also follows that the continuant member of the affricative fortes must be very brief, and the sound-complex a real unit. This circumstance, in turn, strengthens the conviction that the ordinary "non-fortes" affricatives are each essentially single sounds, in spite of their containing two elements. It should be added that "fortis" t*l* is as yet established for but few languages in California, though common farther north, but that ts or tš occurs with "fortis" quality in almost all languages that possess "fortis" p, t, or k.

Lengthened or doubled stop consonants, that is, p, t, or k with occlusion protracted appreciably beyond the ordinary, occur in northern Paiute, probably in Miwok, and very likely in other languages. In Miwok the phenomenon seems to be only part of a more general tendency, nasals, fricatives, and laterals appearing both in long and short form. Mohave lengthens continuants, but not stops. The writing of doubled consonants in itself is little evidence of their existence, on account of the natural English impulse to employ them as a designation of brevity of the preceding vowel. Most of the doubled consonants recorded in Hupa by Dr. Goddard are probably due to measured syllabification resulting from unusually successful efforts at clearness of pronunciation.

Probably the greatest phonetic difficulty encountered by students of North American languages has been the task of dis-

tinguishing between surd and sonant stops. This has long been recognized, and led first to the theory of "alternating" or unstable pronunciation, later to that of alternating apperception due to the existence of sounds "intermediate" between those familiar to the hearer. Investigators in California have encountered their share of the problem.

To begin with, it is obvious that so far as sonancy alone is concerned, a sound cannot be really intermediate between a d and a t, or a b and a p. It must either be voiced or unvoiced. It might however be voiced during occlusion or explosion only and unvoiced during the other part of its formation; or it might be accompanied by more or less breath pressure than is found respectively in sonant and surd stops in European languages, and thereby appear to depart from one type and approach the other.

In writing the Papago dialect of Arizona, the conclusion was reached that stops preceding a vowel normally resembled English sonant stops, but that those at the ends of words or syllables were surd and strongly aspirated. Mechanical experiments by Dr. Goddard confirmed this decision, and brought to light the further fact that the stops in initial position were voiced only during the explosion, their vocalization beginning immediately after the explosion. Subsequently the same status was determined for a related though quite distinct language, the Luiseño of southern California, and so far as the ear and observation alone are to be relied on, for Yuki. In Mohave also the initial stops are voiced during the explosion but final stops are unvoiced and more strongly aspirated. The Yurok stops have generally been heard as surds, but since surd stops in English words are pronounced almost like English sonants by the Yurok, while final stops are more aspirated than initial ones, it seems probable that this language is to be included in the same class. This relation of surd and sonant, or more exactly, the differentiation of what is organically one class of stops into weakly aspirated intermediates and strongly aspirated surds according to position, therefore characterizes several languages, and is likely to be found in others, both in and out of California.

Even where precisely this relation does not exist, intermediate

or explosion-voiced stops occur. This has been experimentally demonstrated for northern Paiute, Wintun, and Salinan by Mr. Waterman, and seems probable for Karok. In Pomo, Yukian Wappo, Chimariko, Maidu, Washo, Miwok, and Yokuts, sonant stops have been written, but in all of these languages heard by the author, surds and sonants are more difficult to distinguish than in English. This circumstance may in some instances be due to other causes, but it is safe to hazard the prediction that in most of these cases it will ultimately be explained by the surdness of the voiced stops during their occlusion, that is to say, their "intermediateness." In short, this type of sound probably occurs in the majority of California languages. It may therefore be presumed that it is by no means rare in other American idioms, and recognition of the type should prove to be the solution, in many instances, of the vexing problem of sonant versus surd stops.

The appended table shows the prevalence, in California, of intermediate stops, coupled in most cases with the occurrence of pure aspirated surds. It is also significant that fully voiced stops are almost lacking. In the one language in the area, Paiute, for which they have been experimentally determined, the sonant stops occur only medially and are so brief in closure as to be almost fricatives.

There seems to be also some tendency for the sonancy of consonants of all classes to be determined by position. In organically voiced continuants, the first portion is sometimes surd when they stand at the beginning of a word or syllable, and the last portion when they are at the end. In Papago not only stops but nearly all continuant consonants gain markedly in breath and lose in voice when they are not followed by a vowel. In other words, many of the consonants of this tongue are organically indeterminate, and become sonant or surd solely according to position. Yurok surd m, n, and r are also evidently only sonants that have lost their voice through standing isolated after a glottal stop. This phenomenon is another that promises to prove to be of more general occurrence than has been suspected.

In many American languages, particularly those of the Pacific coast north of the Columbia river, k and allied sounds have been

OCCURRENCE OF STOPPED CONSONANTS.

	Sonant: sonant occlusion and sonant explosion	Intermediate: surd occlusion and sonant explosion	Surd: occlusion and explosion surd	Surd, aspirated	Surd, with prolonged occlusion	Fortis: accompanying glottal closure
Hupa		+		+		+
Kato		+		+		+
Yurok		+[1]		+		+
Yuki		+[2]		+[2]		+
Pomo		+[3]		+[3]		+
Yana		+	+[4]	+		+
Wintun		+	+[5]	+		+
Salinan		+		+		+
Yokuts		+[6]		+[6]		+
Luiseño		+[2]		+[2]		
Mohave		+[2]		+[2]		
Papago		+[2]		+[2]		
Chimariko		+[3]	+[7]			+
Washo		+[3]	+[7]			+
Maidu		+[3]	+[7]			+
Miwok		+[3]	+[7]		+	
Costanoan		+[3]	+[7]			
Karok		+[3]				
N. Paiute	+[8]	+[9]			+[8]	

[1] Possibly unaspirated surd.
[2] Organically one sound, determined by position.
[3] Indicated by orthography.
[4] Secondary only.
[5] Doubtful.
[6] Probable.
[7] Uncertain whether unaspirated or aspirated surd.
[8] Between vowels only.
[9] Initially only.

found to occur in two positions, which may be designated as palatal and velar. In California the tendency in this direction seems to be less marked. In nearly all languages k sounds differ in position according to the vowels with which they are in contact, but this of course is a phenomenon familiar from English and other languages. Very few California dialects have been proved to have k sounds in organically distinct positions. Hupa and Kato possess velar k in addition to palatal or postpalatal k, but the posterior sound is rare. Luiseño and Mohave have both, probably Chimariko and Shasta also. Gatschet has recorded two k sounds for Klamath. In Pomo and Yurok, velars have often been heard; but it is not impossible that these tongues possess only one k, which is habitually formed rather far back in the mouth and in extreme cases is therefore likely to be heard as a velar sound. Northern Paiute and most Shoshonean dialects, Yokuts, Miwok, Wintun, Maidu, Yana, Yuki, and Karok seem to be of this type.

For the t class of sounds, position of articulation is more easily observed, and evidence of the presence of two series more abundant. Where such occur, the anterior is alveolar, dental, or interdental, the posterior alveolar or palatal. A distinctly posterior t, possibly formed with the back of the tongue against the palate and the tip depressed against the lower teeth, is found in Yokuts, Salinan, and Costanoan, and almost inevitably rings to English ears like tr. The same orthography has been used for a Dravidian sound which probably is very similar. The languages possessing t in two positions are Papago, Mohave, Luiseño, Salinan, Yokuts, Miwok, Costanoan, Yuki, Chimariko, and probably Pomo. The inclusion of Luiseño in this group is interesting, as northern Paiute, and probably most other Shoshonean dialects, possess only one t. Athabascan, Yurok, Wiyot, Karok, Klamath, Wintun, Yana, Maidu, and Washo also seem to be characterized by only one series. The number of linguistic stocks showing two t series is however sufficiently large to be of consequence and to warrant the statement that in the Californian area there is a stronger tendency toward two t's than toward two k's.

Unvoiced l appears in a number of instances, but there has been much confusion between its simple continuant form and its occurrence as an affricative to t. Dr. Goddard has definitely established the presence of both types in Hupa. Both seem to occur also in Yurok, Wiyot, and Wintun. Certain Pomo dialects, Salinan, and Yuman Diegueño seem to possess only the continuant form, while Chumash and Shasta are as yet doubtful in this matter. Shoshonean, Yokuts, Miwok, Costanoan, Maidu, Washo, Yana, Klamath, Karok, Chimariko, Yuki, most Pomo and some Yuman dialects, and presumably Esselen, possessed only sonant l.

Most observers have also been troubled by s sounds. This has been due to the fact that s or š or both are often not formed precisely as in English and other European languages. Sh especially has been described as "between English s and sh." In some instances the difficulty has been due to the existence of only one sound, which differs from s and sh, but resembles both and is easily mistaken for them. This condition may be considered established for Mohave, Paiute, Wintun, Yana, and Yurok. In Hupa also Dr. Goddard recognizes only one s, described as nearly like English s. In the related Kato language, however, and in Karok, Luiseño, and Papago, two sounds analogous to English s and sh, but not identical with them, exist. For other languages, the question must be regarded as still open, although it seems likely that a number of them will prove to contain only one sound of s type. This phenomenon may also be of common distribution through America.

Another sound that has often been heard and recorded in different ways by the same recorder, is Californian h. In many languages this is pronounced with a certain amount of narrowing of the air-passage, at what point is not certain, but giving a perceptibility to the ear, and at the same time an approach to fricative character, not found in English h. Hence a considerable and not altogether unjustified inconsistency of orthography between h and x in many vocabularies and texts. This quasi-fricative quality appears in the h of Hupa, Kato, Yuki, Yana, Costanoan, Paiute, Salinan, Mohave, Papago; and probably also

in Miwok, Maidu, Washo, and such other languages as have been stated to possess the palatal or velar fricative x but show it only sporadically.

In general, fricatives, except of the s type, are sparsely represented in the languages of California. A true k fricative distinct from narrowed h is found in Athabascan, in Salinan, Chumash, and Yokuts, and probably in Karok, Shasta, Chimariko, and Pomo. It occurs also in Shoshonean Luiseño, but not in northern Paiute or Papago. The corresponding voiced fricative replaces stopped g in Yurok, and appears to occur also in Wiyot, in some Shoshonean dialects, in Kato, in Pomo, and in Chumash. Th is known only in Mohave, the corresponding sonant in Mohave and Luiseño. F, also a rare sound in America, exists in Karok, in two Pomo dialects, and, it is said, in Esselen. While usually described as sounding as if labio-dental, it is more probably bilabial. V is abundant as a bilabial in nearly all Shoshonean and Yuman dialects, and occurs also in Karok and possibly in Wiyot.

Ts or tš is found in every native language of California. Other affricatives, except for *tl* in several tongues, seem not to occur, except that kx has been noted in Karok.

The s element in affricatives is sometimes different from independent s. In Hupa Dr. Goddard writes only s, but tš and ts. In Mohave s and tš, but in Yurok š and ts, seem to render the values best. This would be further evidence that ts and tš are organic sounds, not combinations of t with s and š.

Surd nasal consonants, m, n, or ng, have been found in Hupa, in Yurok, in Yana, in Salinan, and in Papago. They are always final or adjacent to surd sounds, especially to glottal stops.

R occurs in Wiyot, Yurok, Karok, Chimariko, Shasta, Wintun, Pomo, and Costanoan; also in the Yuman languages and some of the Shoshonean dialects of southern California. The sound, while obviously not identical in all these languages, is too little understood to make comparison profitable, but it is interesting that its occurrence is over two territories, each somewhat irregular but continuous, indicating the transmission of the sound between distinct linguistic families.

Vol. 8. 1. A Mission Record of the California Indians, from a Manuscript in the Bancroft Library, by A. L. Kroeber. Pp. 1-27. May, 1908 ..... .25
2. The Ethnography of the Cahuilla Indians, by A. L. Kroeber. Pp. 29-68, plates 1-15. July, 1908 ..... .75
3. The Religion of the Luiseño and Diegueño Indians of Southern California, by Constance Goddard Dubois. Pp. 69-186, plates 16-19. June, 1908 ..... 1.25
4. The Culture of the Luiseño Indians, by Philip Stedman Sparkman. Pp. 187-234, plate 20. August, 1908 ..... .50
5. Notes on Shoshonean Dialects of Southern California, by A. L. Kroeber. Pp. 235-269. September, 1909 ..... .35
6. The Religious Practices of the Diegueño Indians, by T. T. Waterman. Pp. 271-358, plates 21-28. March, 1910 ..... .80
Index, pp. 359-369.

Vol. 9. 1. Yana Texts, by Edward Sapir, together with Yana Myths collected by Roland B. Dixon. Pp. 1-235. February, 1910 ..... 2.50
2. The Chumash and Costanoan Languages, by A. L. Kroeber. Pp. 237-271. November, 1910 ..... .35
3. The Languages of the Coast of California North of San Francisco, by A. L. Kroeber. Pp. 273-435, and map. April, 1911 ..... 1.50
Index, pp. 437-439.

Vol. 10. 1. Phonetic Constituents of the Native Languages of California, by A. L. Kroeber. Pp. 1-12. May, 1911 ..... .10
2. The Phonetic Elements of the Northern Paiute Language, by T. T. Waterman. Pp. 13-44, plates 1-5. November, 1911 ..... .45
3. Phonetic Elements of the Mohave Language, by A. L. Kroeber. Pp. 45-96, plates 6-20. November, 1911 ..... .65

Volumes now completed:

Volume 1. 1903-1904. 378 pages and 30 plates $4.25
Volume 2. 1904-1907. 393 pages and 21 plates 3.50
Volume 3. 1905. The Morphology of the Hupa Language. 344 pages 3.50
Volume 4. 1906-1907. 374 pages, with 5 tables, 10 plates, and map 3.50
Volume 5. 1907-1910. 384 pages, with 25 plates 3.50
Volume 6. 1908. 400 pages, with 3 maps 3.50
Volume 7. 1907-1910. 443 pages and 50 plates 3.50
Volume 8. 1908-1910. 369 pages and 28 plates 3.50
Volume 9. 1910-1911. 439 pages 3.50

GRAECO-ROMAN ARCHAEOLOGY. (Large Octavo.) (Published by the Oxford University Press.)

Vol. 1. The Tebtunis Papyri, Part 1. 1902. Edited by Bernard P. Grenfell, Arthur S. Hunt, and J. Gilbart Smyly. xix + 674 pages, with 9 plates. Price $16.00

Vol. 2. The Tebtunis Papyri, Part 2. 1907. Edited by Bernard P. Grenfell, Arthur S. Hunt, and Edgar J. Goodspeed. xv + 485 pages, with 2 collotype plates and a map 16.00

Vol. 3. The Tebtunis Papyri, Part 3. (In preparation.)

EGYPTIAN ARCHAEOLOGY. (Quarto.)

Vol. 1. The Hearst Medical Papyrus. Edited by G. A. Reisner.
Hieratic text in 17 fac-simile plates in collotype, with introduction and vocabulary, pages 48, 1905. (J. C. Hinrichs, Leipzig, 25 marks.)

Vol. 2. The Early Dynastic Cemeteries of Naga-ed-Der, Part I, by George A. Reisner. xii + 160 pages, with 80 plates and 211 text figures. 1908. (J. C. Hinrichs, Leipzig, 75 marks.)

Vol. 3. The Early Dynastic Cemeteries at Naga-ed-Der, Part II, by A. C. Mace. xi + 88 pages, with 60 plates and 123 text figures. 1909. (J. C. Hinrichs, Leipzig, 50 marks.)

Vol. 4. The Predynastic Cemetery at Naga-ed-Der. The Anatomical Material, by Elliott Smith. (In preparation.)

Vol. 5. The Cemetery of the Second and Third Dynasties at Naga-ed-Der, by A. C. Mace. (In press.)

Vol. 6. The Cemetery of the Third and Fourth Dynasties at Naga-ed-Der, by G. A. Reisner. (In preparation.)

Vol. 7. The Coptic Cemeteries of Naga-ed-Der, by A. C. Mace. (In preparation.)

SPECIAL VOLUMES.

The Book of the Life of the Ancient Mexicans, containing an account of their rites and superstitions; an anonymous Hispano-American manuscript preserved in the Biblioteca Nazionale Centrale, Florence, Italy. Reproduced in fac-simile, with introduction, translation, and commentary, by Zelia Nuttall.
Part I. Preface, Introduction, and 80 fac-simile plates in colors. 1903.
Part II. Translation and Commentary. (In press.)
Price for the two parts $25.00

The Department of Anthropology, Its History and Plan, 1905. Sent free on application to the Department, or to the University Press.

Note.—The University of California Publications are offered in exchange for the publications of learned societies and institutions, universities and libraries. Complete lists of all the publications of the University will be sent upon request. For sample copies, lists of publications or other information, address the Manager of the University Press, Berkeley, California, U. S. A. All matter sent in exchange should be addressed to The Exchange Department, University Library, Berkeley, California, U. S. A.

ASTRONOMY.—W. W. Campbell, Editor. (Lick Observatory, Mt. Hamilton, Cal.)
Publications of the Lick Observatory.—Volumes I-VI and VIII-X completed. Volume VII in progress.

BOTANY.—W. A. Setchell, Editor. Price per volume $3.50. Volumes I (pp. 418), II (pp. 360), and III (pp. 400) completed. Volume IV in progress.

CLASSICAL PHILOLOGY.—Edward B. Clapp, William A. Merrill, Herbert C. Nutting, Editors. Price per volume $2.00. Volume I (pp. 270) completed. Volume II in progress.

ECONOMICS.—A. C. Miller, Editor.

EDUCATION.—Edited by the Department of Education. Price per volume $2.50.

ENGINEERING.—Edited under the direction of the Engineering Departments. This series will contain contributions from the Colleges of Mechanics, Mining, and Civil Engineering. Volume I in progress.

GEOLOGY.—Bulletin of the Department of Geology. Andrew C. Lawson and John C. Merriam, Editors. Price per volume $3.50. Volumes I (pp. 435), II (pp. 457), III (pp. 482), IV (pp. 462), and V (pp. 458) completed. Volume VI in progress.

MODERN PHILOLOGY.—Volume I (pp. 400). Volume II in progress.

PATHOLOGY.—Alonzo Englebert Taylor, Editor. Price per volume, $2.50. Volume I (pp. 347) completed. Volume II in progress.

PHILOSOPHY.—G. H. Howison, Editor. Volume I (pp. 262) completed. Volume II in progress. Price per volume $2.00.

PHYSIOLOGY—S. S. Maxwell, Editor. Price per volume $2.00. Volume I (pp. 217) completed. Volume II (pp. 215) completed. Volume III (pp. 197) completed. Volume IV in progress.

PSYCHOLOGY.—George M. Stratton, Editor. Volume I in progress.

ZOOLOGY.—W. E. Ritter and C. A. Kofoid, Editors. Price per volume $3.50. Volumes I (pp. 317), II (pp. 382), III (pp. 383), IV (pp. 400), V (pp. 440), and VI (pp. 478) completed. Volumes VII and VIII in progress. Commencing with Volume II, this series contains the Contributions from the Laboratory of the Marine Biological Association of San Diego.

MEMOIRS OF THE UNIVERSITY OF CALIFORNIA (Quarto).

Vol. 1. 1. Triassic Ichthyosauria, with special reference to the American Forms, by John C. Merriam. Pages 1-196, plates 1-18; 154 text-figures. September, 1908 ..... $3.00

2. The Fauna of Rancho La Brea, Part 1, Occurrence, by John C. Merriam. Pages 197-213; plates 19-23. November, 1911 ..... .30

Vol. 2. Silva of California, by W. L. Jepson. Pages 480; plates 85. December, 1910. $9; buckram $10; carriage extra.

UNIVERSITY OF CALIFORNIA CHRONICLE.—An official record of University life, issued quarterly, edited by a committee of the Faculty. Price, $1.00 per year. Current volume No. XIII.

ADMINISTRATIVE BULLETINS OF THE UNIVERSITY OF CALIFORNIA.—Edited by the Recorder of the Faculties. Includes the Register, the President's Report, the Secretary's Report, and other official announcements.

Address all orders or requests for information concerning the above publications to The University Press, Berkeley, California.

European agent for the series in American Archaeology and Ethnology, Classical Philology, Education, Modern Philology, Philosophy, and Semitic Philology, Otto Harrassowitz, Leipzig. For the series in Botany, Geology, Pathology, Physiology, Zoology and also American Archaeology and Ethnology, R. Friedlaender & Sohn, Berlin.