II. LAKE-MARGIN ECOLOGIC EXPLOITATION IN THE GREAT BASIN AS DEMONSTRATED BY AN ANALYSIS OF COPROLITES FROM LOVELOCK CAVE, NEVADA

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The Indian inhabitants of the Great Basin have been characterized by the simplicity and poverty of their culture. Both the early explorers and the later ethnographers seem to agree with John C. Fremont's statement (1887) that "the labor of their lives was to get something to eat." Beginning perhaps with Daniel G. Brinton's statement (1891:121) that the Indians of the Great Basin were "wretched root digging Utes...[who] had for generations been half starved," modern ethnologic attitudes toward the Great Basin peoples have remained nearly constant. Wissler (1917: 16-17) notes that the scanty diet of the Great Basin is unfavorable to cultural development, Lowie (1923:156) stresses the "primeval" nature of Great Basin life, and Kroeber (1939:50) states that the important factor in the Great Basin environment was its sagebrush-juniper semi-desert. Steward (1938:1) unifies these attitudes toward the Great Basin peoples when he states:

> Most of the Basin Plateau people lived at a bare subsistence level. Their culture was meager in content and simple in structure. Pursuits concerned with the problems of daily existence dominated their activities to an extraordinary degree and limited and conditioned their existence.

Although Steward did feel that the "Owens Valley and possible other Northern Paiute, the Snake River Shoshoni, and the Southern Paiute" were to a certain extent exceptions to his generalizations (op. cit. 233), the picture he paints is essentially the same as Fremont's. The Great Basin Indians remained a simple people because they exploited an extremely inhospitable environment with only the simplest of technologies.

This paper is a report on prehistoric Great Basin Indian diets as reconstructed from an analysis of human coprolites from Lovelock Cave during the period October 1965 through May 1966. The findings differ both with the generalized picture of Great Basin subsistence patterns just noted and in several specific elements of ethnographic Great Basin dietary practices which are mentioned below. The report summarizes the dietary resources utilized by the prehistoric Indians and compares them with the reports of

Indian foods provided by the ethnographers. It indicates that while the Indians of the Humboldt Sink did practice the seed gathering techniques of the Great Basin, the peculiar benefits of a lake shore existence made their subsistence resources far richer than those of their mountain or desert dwelling neighbors.

The coprolites analyzed consisted of fifty specimens collected during the summer of 1965 from two locations in Lovelock Cave, which is situated a few miles to the southeast of, and at an elevation of 350 feet above, Humboldt Sink. The interior sample consisted of thirty specimens and came from a location near the north wall of the cave, well inside the present entranceway. The entrance sample was collected from a location just north of the original entranceway (Loud and Harrington 1929:1, pl. 2) and consisted of twenty specimens.

Tables 1 and 2 summarize our findings, Tables 3 and 4 present the raw data. Typha (cattail) and Scirpus (bulrush) are both lake-margin plants. They comprise over ninety per cent of the seed remains. Thus, they, along with the fish remains, show that foodstuffs secured from the exploitation of Humboldt Lake comprise well over one-third of the prehistoric dietary inventory. Another quarter of the weight of the analyzed remains is subsumed under the category "weight loss." This fraction is comprised of chemicals and fine particles that go into solution during the process of rehydration and, given our present techniques, is irretrievable. Approximately a quarter of the analyzed coprolite weight is referred to as "miscellaneous remains." This category includes hair, egg shell, other seed types, and a grit-like substance (referred to in other papers in this volume as "fines") which appears to be microscopic particles of unidentifiable bones, seeds, fibers, and perhaps flesh residue. This grit-like substance comprises over three-quarters of the miscellaneous remains. Since at least some of the minute bone remains are ichthyoid, and some of the seed fragments are Scirpus or Typha, it seems safe to assume that well over half of the components of the coprolites are the fruits of a lake shore existence.

If the percentage breakdown of coprolite components evidences a generalized lake shore existence, the meal types refine our knowledge of day-to-day dietary habits. Each meal type listed in Tables 1 and 2 is derived from the predominant components of a given coprolite. It takes approximately twenty-four hours for ingested food to form into feces and be voided. Thus each coprolite tells us what its author ate the day before. As can be seen, all but ten meals were "well balanced" in that the coprolites contain large quantities of both animal and vegetal materials. Furthermore, even the relatively "unbalanced" meals contain at least a little animal remains if they are predominantly vegetable, or a little vegetable matter if they are predominantly animal. These meal types are not the evidence of a meager diet. A population leading a truly hand-to-mouth existence would eat what it had when it had it. This would be reflected by coprolites of much more heterogeneous composition. The coprolites of Lovelock Cave can be taken as evidence of a population eating meals of varied but stable composition, albeit within a framework of lake shore exploitation.

Prehistoric Lovelock Valley subsistence habits can be seen as a special lacustrine-oriented example of the basketry-metate complex pictured by Steward (1940) for the Great Basin. Steward (1941) states that the xerophytic vegetation of the Upper Sonoran life zone which characterizes much of the Great Basin caused large game and herbaceous plants to be quite scarce. Thus the native populations were forced to subsist largely on those rodents, birds, seeds, and tubers which the Great Basin offered, with plant foods being the dominant dietary element (ibid. 1938).

The typical Great Basin method of seed preparation was to parch the seeds with live coals on a twined fan-shaped or coiled flat circular basket. When needed, the seeds were ground on metates to form the basis of mush or seed cakes. Hence the basketry-metate complex of the Great Basin is a direct outgrowth of subsistence practices. Not only were seeds prepared in this way, but the bones of rabbits (Lowie 1924) and large herbivores (Steward 1941) were also pulverized on metates to form edible bone cakes. The kutsavi fly was most likely prepared in a fashion analogous to that of seeds (Heizer 1950).

Stewart (1941), reporting specifically about the ethnographic Indian culture of the Lovelock area, amplifies Steward's data. While his informants did refer to occasional communal antelope hunts (cf. Winnemucca 1883) and individual deer and mountain sheep hunts, their dietary habits are reported as being heavily weighted toward plants and smaller animals. Stewart notes the use of fourteen different rodents as common foods, and states that many birds were eaten, including such tough specimens as blackbirds and cranes. Insects were also a common dietary element. Finally, Stewart's informants indicate that grass seeds, roots, berries, tule seeds, cattail seeds, piñon nuts, and many other plants were commonly eaten (see Harrington 1933 for a description of aboriginal cattail seed preparation).

The evidence from Lovelock Cave indicates that its prehistoric inhabitants practiced the basketry-metate food preparation complex, but also utilized different foodstuffs within this cultural framework. There is evidence that not only were seeds parched with live coals, but also that this method was utilized for the parching of small fish. In the fifty coprolites containing seeds, charcoal is present in thirty.

Furthermore, in many cases not only is charcoal present, but the seeds are slightly burnt or roasted. This seems sufficient evidence for prehistoric seed parching. Jennings, in his Danger Cave report (1957:277), has noted the parching and milling of seeds in prehistoric times. Moreover, charcoal is present in twenty-four of the thirty coprolites containing both seeds and fish bone; in fourteen of the twenty coprolites containing seeds but not fish bone, charcoal was absent. This gives a higher correlation of charcoal to fish bone than of charcoal to seeds. Most likely small fish were parched by the same technique used for parching seeds. Fish parching with coals represents a prehistoric food preparing technique within the basketry-metate complex not often found in post-contact times (Lowie 1924; Stewart 1941).

Individual items of prehistoric diet differ from those noted ethnographically. Perhaps most significant is the fact that while the coprolites parallel post-contact Northern Paiute dietary practices in their absence of reptilian or amphibian remains, they contain fewer genera of plants and much less insect remains and rodent bones than would be anticipated by the ethnographic reports. However, this narrowing of food choice is more than made up for by the great amount of lacustrine remains. It would appear that Scirpus and Typha seeds and fish fulfilled the dietary requirements of the prehistoric inhabitants of Lovelock Cave to such an extent that there was little need to resort to such otherwise typical Great Basin practices as grinding and eating animal bones or eating large quantities of insects or rodents. Also, the absence of large amounts of root fibers in the coprolites indicates that it was unnecessary for the prehistoric inhabitants to indulge in the large-scale digging of tubers. Only one coprolite in the sample contains the large amount of fiber indicative of roots. Since the presence of hair in the coprolites implies that some mammals were eaten, perhaps the inhabitants of Lovelock Cave merely stripped, dried, and ate the flesh of those animals they could procure, while discarding the bones. Stewart (1941) reports that this was the practice of the post-contact Lovelock Indians.

The practical absence of piñon nuts and the lack of any sign of kutsavi or kuyui remains in the archaeological coprolites indicate that the prehistoric lake shore dwellers were much less dependent on foodstuffs located in areas outside the Humboldt Valley than were the post-contact Indians. Piñon nuts are noted by every ethnographer as a mainstay of Great Basin Indian diet. However, piñon nut remains are present in only one coprolite of the sample. It would appear that before European contact the Indians had much less need to trek the thirty or so miles southeastward to the Stillwater Range—the nearest locality to the Humboldt Sink with piñon trees.

The same picture is suggested in the case of the kuyui, a large sucker

(Chamistes cujus) inhabiting Pyramid and Walker Lakes, but not Humboldt Lake. Noted by both Loud (Loud and Harrington 1929) and Stewart (1941) as an important item of post-contact Lovelock Valley Indian diet, it does not appear in the sample coprolites. There are, however, the remains of eight specimens of the kuyui found within the fish bones of the Lovelock Cave midden (see Follett, Paper VI herein). The picture, then, for the pre-contact utilization of the kuyui, appears to be the same as that for the piñon nut. While foodstuffs occurring outside the Humboldt Lake area were utilized, the lake was the principal source of food. All but five of the literally thousands of fish bones in the coprolites are those of Gila (Siphateles) bicolor, the so-called tui chub, and practically all of the fish remains in both the coprolites and the midden are those of species native to Humboldt Lake (ibid.)[1]

Of course, in the case of either the piñon nut or the kuyui, it is possible that the prehistoric Humboldt Valley Indians traveled to the localities where they were present, collected the pine nuts or fish, ate them on the spot, and returned home empty-handed. However, the ethnographers note that both items were carried home and stored for hungry times of the year (Winnemucca 1882; Lowie 1924; Steward 1941; Stewart 1941). Thus we are presented with two alternatives: either the prehistoric Indians exploited these two foodstuffs to a much lesser degree than was the case in post-contact times; or their local environment was sufficiently productive so that they could leave it in the fall to collect and feast in other areas without the requirement of bringing back a surplus to survive the Humboldt Valley winters.

Recent radiocarbon dating of coprolites from the two locations in Lovelock Cave demonstrates that not only did prehistoric diet differ from that described ethnographically, but also that it persisted for perhaps one thousand years. A coprolite from the interior location was dated at 1210 ± 60 years B.P. (sample UCLA 1071F), while a specimen from the entrance was dated at 145 ± 80 years B.P. (UCLA 1071E). Since the post-contact Indians were known to have avoided the cave (Stewart 1941), we can be sure that the entrance coprolites were deposited before 1850, when extensive white occupation of the Lovelock Valley began. Thus the two coprolite samples give us a range of food use dating from perhaps 750 A.D. to the late eighteenth or early nineteenth centuries. The interior and entranceway coprolite lots are remarkably similar, as can be seen in Table 1. There is no marked change in per cent of total weight of any coprolite component from one location to the other. Furthermore, in both locations meal types cluster around seed and bird, and seed and fish meals. In the thousand years between the deposition

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[1] See p. 27 for end notes.

of the two lots, the basic diet remained the same. Only a slight rise in meal type complexity and a slight decrease in the use of vegetable foodstuffs going up through time differentiates the two samples. There is not even sufficient deviation in per cent of total weight of coprolite components to statistically separate the two coprolite samples. Thus, for a long period before white contact, the Indians of Lovelock Valley were able to maintain a stable, dependable, and nutritious diet due to their use of lacustrine resources. If, indeed, the cave was the wintertime habitation site of the prehistoric Lovelock Valley Indians as is here postulated, then we can state that winter in the Humboldt Valley was not necessarily a period of such extreme privation as the explorers and ethnographers would have us believe.[2] As stated above, the coprolites demonstrate the regular use of animal and vegetable foodstuffs in combination. They do not demonstrate the randomized exploitation of whatever was momentarily available—a pattern that would characterize a starvation diet.

Archaeologists have recently become increasingly aware of what Jennings and Norbeck (1955) term "enclaves of lacustrine specialization" within the generalized Desert Culture (Heizer n.d.; Jennings 1964; Rozaire 1963). The Sink of the Humboldt typifies an environment suitable for such a specialization. As Rozaire (1963) notes, the artifact inventory of Lovelock Cave demonstrates the development of specialized tools suitable for the exploitation of natural resources leading to a fish-water fowl-water plant diet. The same situation was pointed out earlier by Heizer and Krieger (1956) in their interpretation of the Humboldt Cave culture. Our sample coprolites demonstrate this dependence upon the lake for food and raw materials.

Unfortunately, few of the early explorers adequately described the lake shore dwelling Indians of northwestern Nevada. They seem to have become so tired and dispirited by their long trek from Salt Lake to the Sierra that they dismissed the Indians of the Humboldt Sink with only the barest comment. Thus we have fairly good descriptions of the Indians of Humboldt Wells, South Fork of the Humboldt, and the Reese River, but little of value pertaining to the inhabitants of Humboldt Sink. This is ironically sad, for it was the explorer Joseph Walker who began the process of cultural decay which, in my opinion, caused the ethnographic reports to differ so much from our archaeologic reconstructions. It was in 1833 that Walker's party of mountain men murdered over thirty of the assembled nine hundred Indians at Humboldt Sink, in order to forestall what he considered to be a probable attack (Leonard 1904; Kern 1876:478).

From that time on, as whites began to increasingly traverse the Humboldt Valley, the natives began to lose their original culture. Frightened by the whites from their Humboldt lakeside settlements and lacustrine food sources (Winnemucca 1883; Aram 1907; Stewart 1939:139), they began to exploit the surrounding terrain. By the 1850's the Indians had horses and wagons, and had replaced their economy based on the lake-margins of Humboldt Sink with one based on foodstuffs such as the kuyui, kutsavi, and pine nuts available in other areas. In the ensuing years their original lacustrine culture was largely abandoned and forgotten.

The Indians described by Omer Stewart, Julian Steward, and R. H. Lowie were, therefore, not referring to their ancient culture, but rather to a post-1850 cultural adaptation engendered by the disruptive influences of the white explorers and settlers. Their original, and far richer, lake shore culture can only be reconstructed by the archaeologists.

Notes

1. Other coprolite fish remains include: one bone of Rhinichthys osculus robustus (the Lahonton speckled dace), and four bone fragments of Catostomes tahoensis (the Tahoe sucker).

2. This uncertainty as to seasonality exists because nearly all of the foods identified thus far by us in the coprolites are storable. Pollen analysis will probably tell us whether seasonal occupation was practiced.

TABLE 1

Contents of Human Coprolites from Lovelock Cave, Nevada

Coprolite Components	Interior	Entrance
Total number analyzed	30	20
Total weight (gm) (ave ?), [illegible] !	500	350
Per cent weight loss to total weight after rehydrating and drying	26.8	35.9
Seed (per cent of total weight)	26.8	20.8
Fish bone (per cent of total weight)	8.2	7.7
Fiber (per cent of total weight)	5.8	5.0
Bird remains (per cent of total weight)	1.8	3.8
Misc. remains (per cent of total weight)	30.0	25.9
Coprolites with fish bone	20 (67%)	16 (80%)
Coprolites with abundant bird remains	5 (17%)	10 (50%)
Coprolites with _Typha_ seed	10 (33%)	15 (75%)
Coprolites with _Scirpus_ seed	27 (90%)	12 (60%)
Meal types (preponderance of item or items identified per coprolite)		
Seed	4	1
Fish	2	0
Fiber	1	0
Seed and fiber	2	0
Seed and fish	15	8
Seed and bird	6	5
Seed, bird and fish	0	4
Seed, fish and fiber	0	1
Seed, bird and fiber	0	1

TABLE 2

Meal Types by Coprolite
(the preponderant item or items in a given coprolite)

Spec. No.	Interior	Spec. No.	Entrance
5	Seed and fish	10	Seed and fish
6	Seed and fish	11	Seed and bird
7	Fish	12	Seed, bird and fish
8	Seed and fish	16	Seed and fish
9	Seed and fiber	17	Seed and fish
13	Fiber	18	Seed, bird and fish
14	Seed and fish	19	Seed and fish
15	Seed and bird	23	Seed, fish and fiber
20	Seed and fish	29	Seed and fish
21	Fish	31	Seed and bird
22	Seed and fish	33	Seed and bird
24	Seed	35	Seed
25	Seed	38	Seed and bird
26	Seed and fish	44	Seed, bird and fish
27	Seed and fish	45	Seed and bird
28	Seed and fish	46	Seed and fish
30	Seed and fish	47	Seed and fish
32	Seed	48	Seed and fish
34	Seed and fish	52	Seed, bird and fiber
36	Seed and fiber	56	Seed, bird and fish
37	Seed		
39	Seed and fish		
40	Seed and fish		
41	Seed and bird		
42	Seed and bird		
43	Seed and bird		
49	Seed and bird		
50	Seed and fish		
51	Seed and bird		
55	Seed and fiber		

TABLE 3

Raw Data on Interior Coprolites
(Weights in grams)

Sp. No.	Orig. Wt.	Total[†] Wt.	Wt. Loss	Weight of Iden.	Weight of Uniden.	*Scirpus*	*Typha*	Fiber	Charcoal	Fish Bone	Bird Bone	Feather	Bird Skin	Other*
5	24.6	19.9	5.6	11.5	2.8	10.0	-	x	0.4	1.1	-	x	x	-
6	39.5	32.8	9.6	15.3	7.9	10.5	4.2	x	x	0.6	-	x	-	-
7	27.9	21.0	6.0	9.1	5.9	0.9	-	1.0	x	7.1	-	x	-	0.1(7)
8	39.2	32.9	3.3	18.4	11.2	3.8	-	3.7	x	7.8	-	-	-	x (4), 3.1(7)
9	12.0	9.5	4.0	4.4	1.1	1.2	-	3.2	x	-	-	-	-	-
13	14.4	10.5	2.5	3.9	4.1	x	-	3.8	-	-	0.1	-	-	x (4)
14	13.0	9.8	3.6	4.2	2.0	1.5	-	x	x	2.7	-	x	-	x (7)
15	17.2	14.3	3.6	4.6	6.1	2.2	0.5	-	x	-	0.4	1.5	-	-
20	4.6	4.6	0.1	2.8	1.7	1.3	0.3	x	x	0.3	-	x	-	0.9(8)
21	32.1	27.1	6.8	10.8	9.5	2.8	2.0	x	0.1	5.8	-	x	-	x (4), 0.1(7)
22	31.2	27.5	5.6	11.3	10.6	3.4	7.8	-	-	0.1	-	-	-	x (5), x (7)
24	28.5	23.7	11.7	6.8	5.2	4.3	2.5	-	-	x	-	x	x	x (4), (5), x (7)
25	26.5	20.0	6.7	8.9	4.4	8.9	-	x	x	x	-	x	-	-
26	26.0	21.2	3.4	10.1	7.7	1.4	-	3.0	x	5.7	-	x	-	x (1), (6), x (7), (8)

27	21.9	18.7	6.4	5.9	6.4	4.6	-	1.2	-	0.1	-	x	-	x (6), (7)
28	21.5	17.7	4.6	6.0	7.1	1.5	-	1.3	x	3.2	-	-	-	x (1)
30	27.4	25.2	8.0	12.3	4.9	11.1	-	x	x	1.2	-	x	-	-
32	16.9	12.3	3.6	6.3	2.4	1.0	4.8	0.1	-	-	x	x	-	0.1(1), x (4), 0.3(7)
34	19.4	16.3	5.7	5.2	5.4	3.0	-	0.6	x	1.6	-	-	-	x (4), (6) x (7), (8)
36	13.2	10.3	2.1	5.1	3.1	0.5	-	4.4	x	0.1	-	-	-	0.1(7)
37	11.2	6.3	3.2	0.9	2.2	-	0.9	x	-	-	-	-	-	-
39	12.4	8.9	2.6	3.9	2.4	1.4	x	1.5	x	0.2	-	x	-	x (2), (6), 0.8(7)
40	26.0	18.5	5.9	6.4	6.2	3.1	x	x	x	3.3	-	x	-	x (4), (7)
41	21.6	16.6	3.0	8.5	5.1	2.0	0.7	-	-	-	1.7	1.8	2.3	x (4), (5), (7)
42	17.2	14.9	5.0	5.7	4.2	5.7	-	x	-	-	-	x	x	x (7)
43	22.7	20.9	4.9	8.2	7.8	6.9	-	x	x	-	1.3	x	x	x (1), (4), x (5), (7)
49	10.5	6.3	1.1	3.4	1.8	2.2	-	1.1	-	-	0.1	x	x	x (4), (7)
50	9.7	6.5	1.1	3.1	2.3	2.5	-	0.4	0.1	0.1	-	-	-	-
51	10.0	7.0	1.7	3.8	1.5	3.6	-	0.1	x	-	-	x	x	0.1(6)
55	19.6	17.3	2.9	7.0	7.4	2.2	1.2	3.4	x	0.1	-	-	-	0.1(7)

*Other: (1) gravel (2) egg shell (3) mammal bone (4) hair (5) insect (6) snail shell (7) unidentified seeds (8) pine nut

- = absent
x = trace
† = analyzed weight

TABLE 4

Raw Data on Entrance Coprolites
(Weights in grams)

Sp. No.	Orig. Wt.	Total† Wt.	Wt. Loss	Weight of Iden.	Weight of Uniden.	*Scirpus*	*Typha*	Fiber	Charcoal	Fish Bone	Bird Bone	Feather	Bird Skin	Other*
10	34.0	30.1	9.2	13.6	7.3	0.6	3.5	x	0.4	9.1	-	-	-	x (7)
11	41.1	37.2	18.0	10.2	9.0	x	6.8	x	x	-	2.7	0.5	0.2	x (4), (7)
12	27.3	24.4	7.3	8.8	8.3	x	5.0	x	x	x	0.5	2.7	x	0.6(1), x (5), (7)
16	25.2	20.9	10.6	3.5	6.8	1.0	-	1.5	0.2	0.7	-	x	-	0.1(7)
17	28.9	25.4	12.8	11.1	1.5	8.6	-	2.5	x	x	-	-	-	x (5), (7)
18	14.0	10.9	2.4	6.1	2.4	3.4	2.3	-	x	0.4	0.4	x	x	-
19	23.1	19.0	6.3	7.9	4.8	0.2	5.4	0.8	0.6	0.9	-	x	-	x (2), (5), x (7)
23	21.9	19.1	8.1	5.5	5.5	0.4	0.6	0.7	x	3.4	-	x	-	0.4(7)
29	27.9	24.5	3.8	12.0	8.7	1.3	6.6	1.9	0.2	1.8	-	x	-	0.2(1), x (5), (7)
31	13.6	11.8	5.2	3.5	3.1	x	1.9	x	-	-	0.3	1.3	-	x (7)
33	14.0	10.3	1.6	3.9	4.8	x	2.3	0.1	x	0.9	0.5	x	-	0.1(7)
35	10.4	8.6	2.5	3.4	2.7	1.3	2.0	0.1	-	x	-	x	-	x (4)
38	11.3	9.2	2.9	2.3	4.0	x	1.5	0.3	-	-	0.2	0.1	-	0.2(1), x (4)

44	18.4	14.7	4.1	6.1	4.5	0.6	2.4	0.2	-	0.3	2.2	0.3	0.1	-
45	7.3	5.6	1.6	1.9	2.1	1.3	x	x	-	-	0.4	0.2	-	x (7)
46	10.6	7.8	2.4	2.8	2.6	1.6	0.7	x	x	0.5	-	x	-	x (4), (7)
47	13.2	10.8	1.8	5.0	4.0	3.0	-	x	0.8	1.2	-	-	-	x (7)
48	12.0	9.6	1.3	4.9	3.4	0.7	2.0	x	0.1	2.0	-	x	-	0.1(7)
52	34.6	29.6	14.2	12.6	2.8	3.1	-	8.7	-	x	0.5	0.1	0.2	-
56	25.0	21.5	9.7	9.4	2.4	x	1.6	0.7	0.8	5.8	-	0.2	-	x (4) 0.3(7)

* Other: (1) gravel
(2) egg shell
(3) mammal bone
(4) hair
(5) insect
(6) snail shell
(7) unidentified seeds
(8) pine nut

\- = absent
x = trace
÷ = analyzed weight

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