

INCAPARINA: A LOW COST VEGETABLE MIXTURE AND ITS COMMERCIAL APPLICATION*

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THE Institute of Nutrition of Central America and Panama (INCAP), after studying the increasingly serious problem of protein deficiency and working to develop preventive measures for its member countries, concluded that high quality oilseed flours (cottonseed and/or soya) combined with cereal grains constitute one of the most practical and inexpensive sources of good quality protein. In the developing countries, where the problem of protein deficiency is greatest, the potential availability of suitable cottonseed flour, and to some extent soya flour was a significant ecological factor in INCAP's decision to develop suitable vegetable mixtures of this type. Recognizing the need to develop and achieve the widest possible distribution of an acceptable food product based on such protein sources, INCAP initiated its basic research in this field some 15 years ago. These efforts have resulted in the low cost protein-rich food supplement, Incaparina. As the product, its laboratory development and its testing are adequately described in the literature, e.g. BEHAR and BRESSANI (1966), BRESSANI *et al.* (1961a, b), SCRIMSHAW (1961) and BRESSANI *et al.* (1962), it is sufficient to state that Incaparina is a vegetable mixture containing 25 per cent or more of proteins comparable in quality to those of animal origin. This article will deal with the collaborative efforts of the respective governments, private food industry companies and INCAP, to bring Incaparina from the laboratory to the present position it occupies in the market and in the homes of consumers in Central America. This is an undertaking which is still far from complete, even though Incaparina was among the first of such products to reach full scale commercial status.

1. LABORATORY TO CONSUMER: INCAP'S ROLE

With the completion of the extensive formula development work and the biological and clinical testing of the product in 1959, Incaparina was then ready for the next steps toward

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‡ INCAP is a cooperative international institute established by the countries of Central America and Panama for the purpose of studying the nutrition problems of the area, finding solutions for these problems, and assisting the member countries in applying these solutions. It is administered by the Pan American Sanitary Bureau (PASB) and its research programme is guided by a Technical Advisory Committee of experts in nutrition and allied sciences. A council consisting of representatives of the member countries meets periodically to discuss the new nutrition research. It also plans nutrition programmes to be carried out in cooperation with the Departments of Health of the member countries. INCAP's basic budget is provided by equal quotas from the member countries and by funds contributed to its operation by PASB. It also receives important contributions for its research and applied activities in the form of grants given by institutions like the National Institutes of Health, The National Research Council, W. K. Kellogg Foundation, The Rockefeller Foundation, The Nutrition Foundation, Parke Davis Company and others.

its realization as a viable consumer product. Table 1 contains the Incaparina formulas currently in commercial distribution.

It was apparent to INCAP that both consumer acceptability and the product's commercial marketability would have to be amply demonstrated before Incaparina could be offered to responsible food industry companies. In addition, preliminary cost studies would also have to be made in order to justify the economics of the low price at which it must arrive to the ultimate consumer. Thus the field trials, summarized below, were designed and carried out by INCAP to determine both acceptability and marketability. At the same time, some realistic costing of production and distribution was secured.

TABLE 1. BASIC FORMULAS AND ALTERNATIVE MODIFICATION IN GRAIN CONTENT WHICH MAY BE USED IN THE PREPARATION OF INCAPARINA

Ingredients (g/100 g)	Formulas			Alternative modifications for grains permitted
	No. 9	No. 14	No. 15	
Ground whole cooked corn	58	58	58	Amount of rice, corn or sorghum or other suitable grains (cooked) may be varied and used separately or together in such a way as to account for 58 g per 100 g of the total product.
Cottonseed flour	38		19	
Soya flour		38	19	
Torula yeast	3	3	3	
CaCO ₃	1	1	1	
Vitamin A, I.U.	4500	4500	4500	4500

Consumer acceptability testing

With the assistance of UNICEF, a test batch of Incaparina was prepared and packed in 75-g bags for the initial consumer testing. A distribution was made among seventy-six families in widely separated Guatemalan communities. The areas were representative of the various cultural, economic and climatic conditions found in most of Central America, and similar to many other tropical and sub-tropical regions of the world.

Mothers were carefully instructed in the preparation of the product. These trials varied from 17 to 19 weeks in duration. The emphasis in these tests was on the pre-school children, though other members of the family did participate. Initial acceptance among both children and adults was extremely good and tended to improve during the test period, SHAW (1960). Trials were also carried out among a representative group of pre-school children in the major city of El Salvador. A similar pattern of acceptability of 88 per cent was found with this group at the end of the fourth week.

Further tests, with similar results, were completed in Honduras and Nicaragua during 1959. This field experience served as the basis for the subsequent market testing of the product in Guatemala.

Marketing trials

In collaboration with an interested commercial firm and the Guatemalan Ministry of Health, a three-month market test was undertaken in the town of Palin, a community of 3600 inhabitants located near Guatemala City (SHAW, 1960; 1965). Simultaneously with the announcement to the press by the Minister of Health, the commercial firm placed the

product with the small retail outlets in the community. The introduction of the product was accompanied by demonstrations given at the local health centre. In addition, some modest commercial promotional efforts were made. Demand stabilized at about 1200 of the 75-g bags per week and remained at this level during the 5-month trial.

This initial experience with commercial sales led to a more extensive marketing test in 1960, involving Guatemala City and some forty communities in the interior of the country. Some limited commercial promotion, using traditional media, was mounted by the producer. The health centres also participated in local promotional efforts during this phase of the trial. Most of the 114,000 lb of Incaparina which moved through the retail outlets was in the form of the 75-g bag, sufficient to provide the protein, vitamin and mineral supplement for one child for a day. Some institutional use was also made of the product during this test.

The results gained from this experimental commercial distribution with Incaparina were sufficiently favourable to justify proceeding with a programme of full scale commercial production and distribution throughout the Central American region and in other areas where there might be a need for such a product. The first such commercial venture was undertaken in Guatemala so as to build directly on the experience which had been gained with the product in that country.

Commercialization policies and their administration

Careful investigation of various alternative methods of distribution of such a low cost protein food and the experience gained through INCAP's field testing, led to the conclusion that the most effective way to make the fruits of this research available to the greatest number of people would be through commercial production and distribution by qualified food industry or closely related private companies. It was also recognized that this approach, a distinct departure from the normal procedures followed by scientific research organizations, would require a specific set of standards to guide the three participants (governments, industry and INCAP), in the collaborative effort. The policy guide lines were, therefore, established in the INCAP Directing Council Resolution VIII of August, 1960. These were later revised through a new Resolution IX, adopted by the Council in August, 1966, which now serves to guide the programme in its present form (INCAP, 1960-1961).

In summary, INCAP's policies covering Incaparina provide that the food industry companies, who have been qualified for authorization to handle the product in a specific market area, will agree to certain basic standards in return for use of the Incaparina formulas and the trade mark registered name. To protect the consumers and the product and to provide a basis for these formal understandings with producers, INCAP applied for formula patents and the trade mark registry in those countries where a product of this type would seem to serve a public health need. It is within this framework of policies and administration that the product was offered to the food industry in 1961.

Relationship with Incaparina producers

Mindful of the abuses to which a new food product having the potential of a truly low cost protein-rich product could be exposed, three areas of control were incorporated in the programme from its inception. These standards cover control of the product's quality and its price, and the supervision of the promotion used in its marketing. Provisions covering these basic factors are included in each of the authorizations granted to qualified producers. They are the same for all producers and are administered by INCAP.

The arrangements with the qualified private companies is formalized through an authorization granted to the producer, usually for a 10-year period. Such authorizations are only granted following consultation with and the approval of the Ministries of Health of the respective countries involved. Authorizations are normally granted on an exclusive basis, unless there is some legal or other restriction prohibiting such an arrangement in the specific country. Experience early in the programme showed that this measure of protection for the producer was required in order to give him the time to carry out the extensive and costly development work needed to establish such a new food product in the commercial market.

Quality control

Quality control, though a primary responsibility of each Incaparina producer, is regularly checked by INCAP analysis of samples or through delegation of such testing to recognized national laboratories. Where necessary, INCAP has provided technical assistance to producers in their own quality control programmes and directly analyzes raw material on request. This has ensured that the Incaparina distributed in Central America and elsewhere during the past six years has maintained the quality standards according to which it was designed.

TABLE 2. INSTITUTE OF NUTRITION OF CENTRAL AMERICA AND PANAMA (INCAP)
COMPARATIVE COST PER SERVING OF VARIOUS PRODUCTS
(U.S. Dollars)

Product	Cost per pound (\$)	Grams used per 8 oz glass (g)	Cost per glass (\$)
Incaparina	0.20	25	0.011
Powdered skimmed milk	0.80	25	0.044
Instant oats	0.39	20	0.017
San Vicente flour (arrowroot)	0.30	25	0.017
Maizena (corn starch)	0.28	25	0.015
Maizena-Atol (with flavours)	0.80*	—	—
with water	—	12	0.021
with milk	—	12	0.060

COST OF PROTEIN CONTAINED IN VARIOUS PRODUCTS

Product	Retail cost† per pound in Guatemala (\$)	Protein‡ (%)	Cost per pound of protein (454 g) (\$)	Quantity of protein per U.S. \$0.10 (g)
Incaparina	0.20	27.5	0.73	62
Powdered skimmed milk	0.80	35.0	2.29	20
Instant oats	0.39	15.0	2.60	17
San Vicente flour (arrowroot)	0.30	1.4	21.43	2.1
Maizena (corn starch)	0.28	1.0	28.00	1.6
Maizena-Atol (corn starch with flavours)	0.80*	1.0	80.00	0.6

* Eight packages of 60 g each.

† Guatemala prices, January, 1968.

‡ Protein percentage taken from INCAP-ICNND Food Composition Table or INCAP analysis.

Pricing

A fundamental principle has been that Incaparina must return a reasonable profit to the producer and distributors so that the concept of commercial sale for regular home use can be maintained. It was in recognition of this principle that cost studies were undertaken, in preparation for the product's release to industry. These studies were based on the pilot production and distribution experience gained during the Guatemalan field trials. They showed that the product could reach the Central American consumer at a price considerably below any other comparable source of good quality protein, such as powdered milk, for example. The early cost studies, which have been confirmed through subsequent experience in other markets, both within and outside Central America, have shown that Incaparina can be priced from four to six times less than powdered milk, assuming that adequate sales volumes are achieved. Table 2 shows the price comparison of Incaparina in Guatemala with powdered milk and other foods of similar use. Another form of price comparison, based on the protein contents of the respective foods, is also shown on the same table. Figure 1 is a graphic presentation of this same data.

The establishment of an agreed price to the ultimate consumer, and special prices for institutional use by government and social welfare organizations, is based on cost analysis

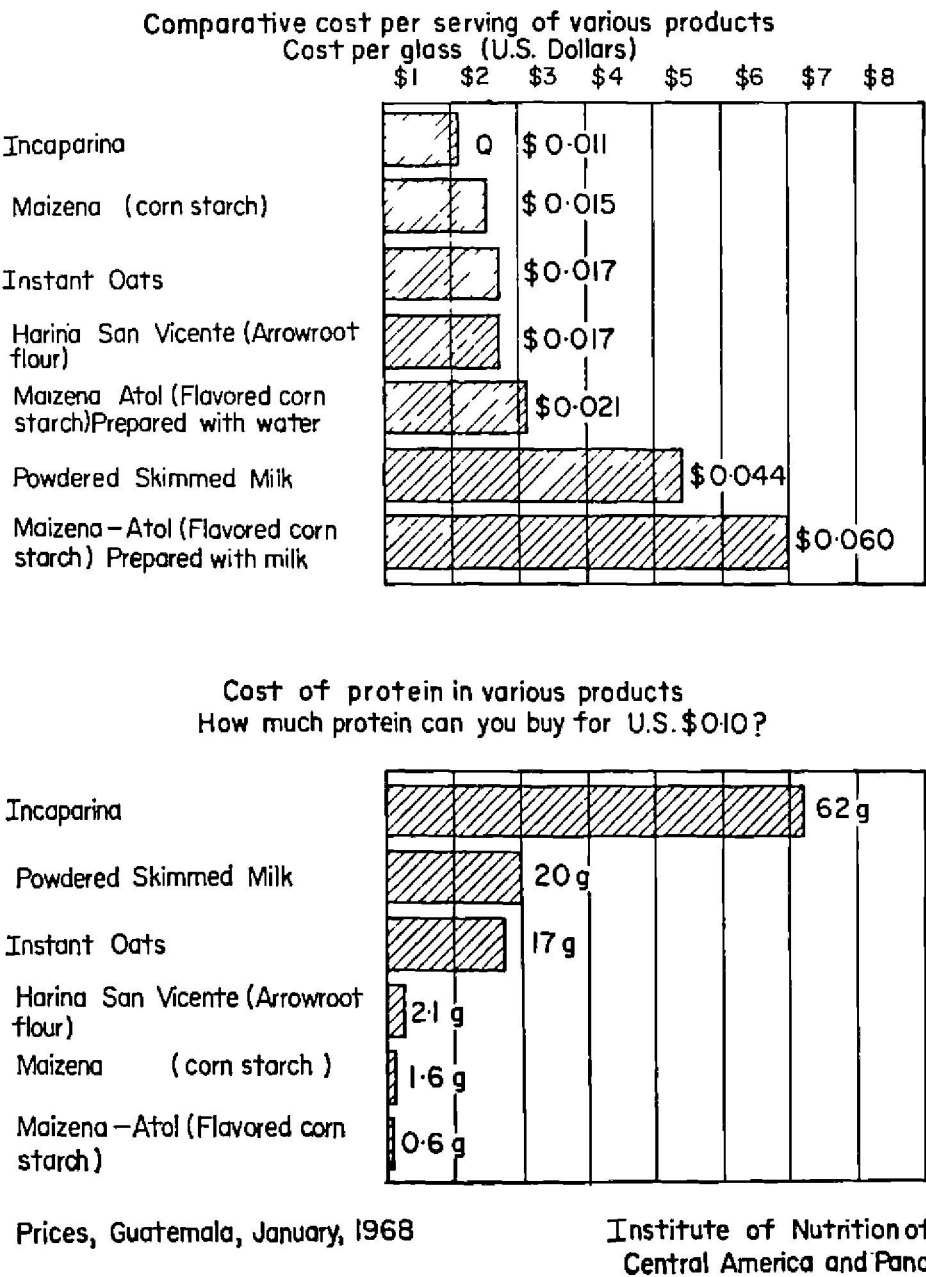


FIG. 1. Costs of Incaparina and of its protein compared with those for other infant foods.

made by INCAP and the prospective producer in negotiating the formal authorization. The price may then be re-negotiated at any time that changing economic conditions warrant.

Promotion

The basic responsibility for the promotion and advertising of Incaparina in the commercial market rests with the producers. Nevertheless, as this is a product which has been developed in the public interest for the purpose of contributing to the solution of a serious public health problem, i.e. protein malnutrition, INCAP established a set of standards which producers are to follow in the promotion of the product. These in no way impede the use of all normal promotional media, but they do serve to protect the consumer from misrepresentation of the product. This provision of the arrangement with producers is handled through a prior review of advertising materials, packaging, radio scripts, etc. by INCAP, or a designated institution in the country where the product is being marketed.

The philosophy which INCAP has followed in all its relationships with the Incaparina producers is that they have the responsibility to carry out all aspects of the commercialization of the product within the agreed standards. It is assumed that the companies are fully competent to plan and execute any consumer acceptability and marketing trials that will be necessary, as well as the handling of all aspects of the product's manufacture, promotion and distribution. Of course, INCAP, within its area of competence, does stand ready to assist producers on request. Otherwise, the Institute does not intervene in the commercialization process. Areas where INCAP has been called upon for assistance cover such matters as the testing of raw materials, assistance to plants producing the protein concentrate, consultations on promotional programmes and assistance to the Governments concerned in the interpretation of the Incaparina programme. In other words, the relationship is a collaborative one, with the Incaparina producer having the major responsibility for the product's success within his respective market.

2. THE PRESENT STATUS OF COMMERCIAL DISTRIBUTION

Guatemala

The Guatemalan company selected to handle the product was the Cervecería Centroamericana, S.A., the country's principal brewer and soft drink producer. The management of this company had expressed an interest in diversifying into the food field and, in addition, was well equipped to control the quality of its products, had its own distributing company, and had access to adequate financing to carry out the project. The authorization was granted in December 1960 and distribution started in May of 1961, being gradually extended throughout the country. Though sales in Guatemala showed a steady increase during the first few years, volumes did not reach expectations until mid 1964. By then the support of public health officials and the medical profession in recommending Incaparina as a low cost protein supplement had begun to be effective. Therefore, demand for the product was good. However, distribution through retail stores was not adequate during the first few years. The situation was reviewed with the producer early in 1964 and steps were taken to remedy the problem. This took the form of a specialized Incaparina sales and distribution unit within his general distributing organization. INCAP participated in the training of the Incaparina salesmen and the demonstrators who were employed to staff this unit. The effects of these changes in marketing arrangements were immediate and dramatic. Sales during May, 1964, reached 44,000 lb in comparison with the previous month's total of 30,500. In June sales climbed to 60,000 lb and reached 100,000 by December of that year.

Further strengthening of the sales organization and the development of a full scale promotional programme, including extensive radio coverage and some newspaper and TV advertising, has provided continual growth of the use of Incaparina in Guatemala. Consumer surveys made during 1965 by the producer, as well as by INCAP, showed that Incaparina was well known as a good nutritive low cost food. The proportion of families using the product was found to be encouragingly high, 62 per cent in the producers' survey and 45 per cent in the INCAP survey. This evidence, plus the continuing sales growth, has confirmed that Incaparina has now found a high degree of acceptance in Guatemala.

Colombia

In Colombia, Productos Quaker, S.A., a subsidiary of the Quaker Oats Company of the United States, embarked on a full-scale programme of consumer research shortly after receiving the INCAP authorization in 1961. This led to successful market testing, and the decision was made to launch Incaparina on a national scale in that country in 1965. Due to fundamental differences between marketing conditions in Colombia and those in Guatemala, it was necessary for this company to undertake a great deal of pioneering work in adapting Incaparina to the conditions in Colombia. These efforts are now being rewarded, as sales are reaching the point of commercial success. Therefore, it is gratifying to be able to report that recently officials of this company have publicly expressed satisfaction with the commercial potentialities of Incaparina in Colombia.

Other Central American countries

In 1965 it became apparent that the INCAP member countries, other than Guatemala, could best be served by grouping them around no more than two producers serving regional markets. Following extensive negotiations with the governments and interested producers, the present arrangement was developed. This provides for the Guatemalan Incaparina producer to extend his distribution into both Honduras and El Salvador. The first step was taken in October of last year when the product was introduced in Honduras. Commercial marketing was started in El Salvador early this year. In order to serve the three-country market, the Guatemalan producer is now completing construction of a new and modern plant on the outskirts of Guatemala City.

The other two Central American Common Market countries, Nicaragua and Costa Rica, are being served by *Quaker de Centroamerica, S.A.*, a subsidiary of the Quaker Oats Company. Market testing in Nicaragua has been started, to be followed later by similar testing in Costa Rica. Extensive consumer acceptability testing was done in both countries prior to planning the market testing phase. Hence, the five Central American countries are now the responsibility of companies with a sound background of experience with the product.

Panama

Since it is not a member of the Central American Common Market, and as it is a relatively small market, making Incaparina available in Panama presented special problems. Nevertheless, because of the keen interest of the Government and a local company, *Central Agrícola*, an INCAP authorization was granted in 1962. Early efforts to set up a fully integrated plant operation were found to be both costly and inefficient for a market of that size. Nevertheless, efforts to find a viable solution were pursued by INCAP, the Government and the producer.

During 1966, arrangements were made to simplify the production process through the use of Incaparina pre-mix, supplied by the larger Incaparina producers. This pre-mix, containing all of the ingredients except the corn flour, was originally supplied by the Colombian producer but more recently has been brought in from Guatemala. A further simplification has been the use of a toasted corn flour rather than the precooked type, which requires more expensive and higher volume equipment, not suitable for a small scale operation. In addition, a slightly higher price was granted to assist in compensating for the smaller anticipated sales volume. Though it is too early to make a definitive judgment as to whether or not sales will be sufficient in Panama to support a viable commercial operation, the prospects seem fairly bright at this point.

3. PROSPECTS AND POTENTIAL

The past six years of experience with the INCAP vegetable mixtures has served to demonstrate several points of considerable importance in the alleviation of protein malnutrition. First, it has now been demonstrated that a soundly conceived protein food, based on vegetable sources of good quality protein, can reach through regular commercial channels those who need such a supplement. Furthermore, this has been done without either direct subsidies from governments or international agencies, or through large scale institutional purchases. Hence, almost all of the Incaparina which has been produced in both Guatemala and Colombia has been purchased for regular use in the home. In reaching the home, the product can have its most significant impact on the nutritional problems of the pre-school child and the pregnant and lactating mother, those most vulnerable to protein and vitamin deficiencies. The fact of its availability through regular commercial channels places the product in a more meaningful long range context than emergency food distribution schemes or purely institutional feeding programmes.

In spite of some increases in raw material costs, the low price to the consumer has been maintained. Incaparina, therefore, retains its position as the lowest priced among the several recognized protein foods now on the commercial market. Table 3 contains a price comparison of Incaparina with some of the other protein foods now commercially marketed. Higher volumes, with sales reaching 5.2 million pounds during 1967, helped to maintain the low price. The sales growth since 1964 has been a steady one, as shown on Fig. 2. The future should see a significant expansion of distribution within the existing markets and, hopefully, the opening of new areas where low cost protein foods are needed.

TABLE 3. PROTEIN PRODUCTS RETAIL PRICE PER POUND AND SALES VOLUMES

Product	Country	Retail price per pound (\$)
<i>Cereal products</i>		
Incaparina	Colombia	0.12
Incaparina	Guatemala	0.20
Multi-purpose food	Brazil	0.27
Pronutro	S. Africa	0.31
Fortifex	Brazil	0.35
Arlac	Nigeria	0.36
Multi-purpose food	India	0.38
<i>Bottled drink</i>		
Vitasoy (3% protein, bottled drink)	Hong Kong	(\$0.026 per bottle) 2,500,000 cases (1964)

Note: Data for products other than Incaparina were taken from "The Production of Protein Products from Oilseeds", Tropical Products Institute, 1966.

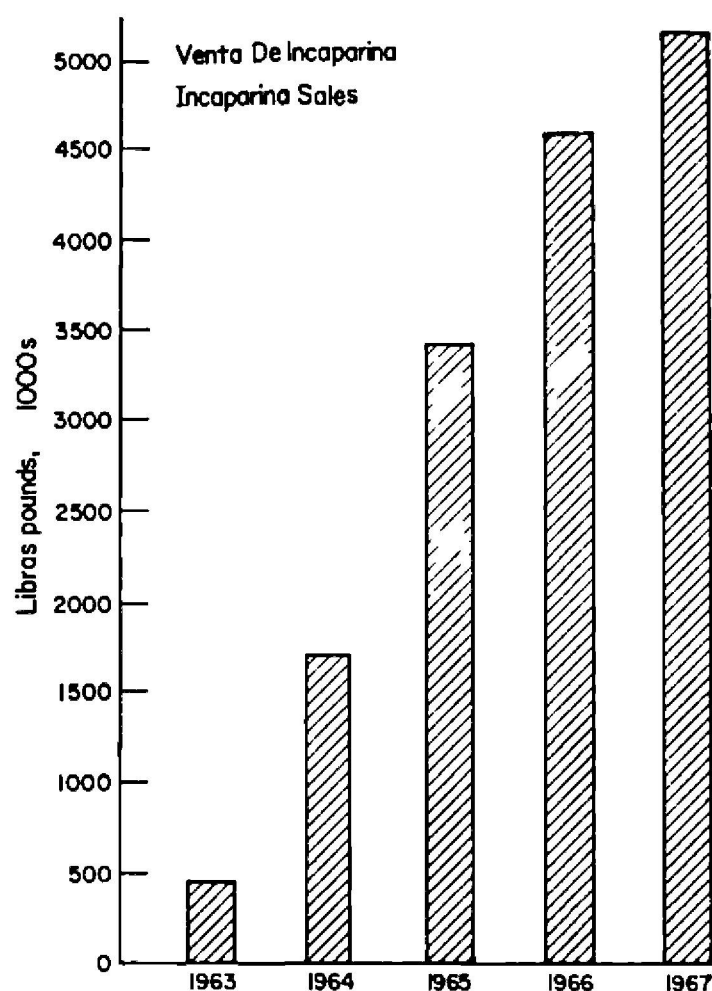


FIG. 2. Sales of Incaparina 1963-1967.

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