PRODUCTIVITY COMMISSION

Productivity Commission Submission to the Department of Foreign Affairs and Trade on the Cartagena Protocol on Biosafety

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The Cartagena Protocol on Biosafety: some preliminary observations

The Commission's approach

To assess new regulatory proposals, including those resulting from Australia's ratification of international treaties such as the Cartegena Protocol on Biosafety, the Commission usually favours a benefit cost approach. This involves the identification and evaluation, vis a vis the regulatory status quo, of all the benefits and costs to Australia associated with the new proposal. If the total benefit exceeds the total cost of the proposal, in principle, it would be economically efficient to proceed.

However, in assessing the Protocol, the Commission takes a cost-effectiveness approach. This considers whether the stated objective would be achieved at least cost to Australia by ratifying the Protocol, relative to the regulatory status quo.[1] (In other words, the approach takes the stated objective as a 'given' and considers only the relative costs of Protocol.) An important indicator of the cost effectiveness of a new regulatory proposal is the degree to which it *directly* targets a *clearly* identified problem or objective.

The reason for this approach is the difficulty in evaluating the stated objective (and, hence, the primary benefit) of the Protocol (see below).[2]

1 The regulatory status quo involves domestic regulation administered by various agencies such as AQIS/Biosecurity Australia and the Interim Office of the Gene Technology Regulator as well as international agreements (particularly the WTO SPS Agreement). Domestic regulation, at this time, is assumed not to include the Gene Technology Bill 2000, which was introduced into Parliament in April. The Bill sets out a regulatory framework (and establishes the Gene Technology Regulator) to govern all genetically modified organisms, whether imported or domestically produced. It was referred to the Senate Committee on Community Affairs; a report has been recently issued (SCCA 2000).

2 There are fundamental problems in measuring and quantifying biodiversity, and in assessing changes from year to year (Boyle and Sayer, 1995). Measuring biodiversity in dollars, let alone in volumetric terms, is no easy exercise. The reason for this is the absence of explicit markets (and, hence, market prices). Nonetheless, a few studies have attempted to value biodiversity in recent years. For example, the New Zealand Ministry of Environment in 1998 estimated the value of the "indigenous natural environment" at NZ$46 billion a year and Pimental recently estimated the

The paper begins by looking at the problem that the Protocol seeks to address. It then discusses briefly key aspects of the Protocol that could potentially undermine its cost-effectiveness. This is followed by some remarks on the implications for Australian exporters and importers if the Protocol enters into force without Australian ratification and membership.

What is the problem?

The stated objective of the Protocol relates to "the conservation and sustainable use of biological diversity", which may be adversely affected by the trade (or "transboundary movements") of "living modified organisms" (article 1). "Biological diversity" (or biodiversity) refers to the number and variety of living organisms on the planet and is defined in terms of genes, species and ecosystems (UN Environment Programme 2000, p. 1/1).

"Living modified organisms" are defined in the Protocol as living organisms that possess a "novel combination of genetic material obtained through the use of modern biotechnology" (article 3.g). "Living organisms" means any biological entity capable of transferring or replicating genetic material, including sterile organisms, viruses and viroids (article 3.h). "Modern biotechnology" is defined as the application of:

> a) In vitro nucleic acid techniques, including recombinant deoxybribonucleic acid (DNA) and direct injection of nucleic acid into cells or organelles, or
>
> b) Fusion of cells beyond the taxonomic family
>
> that overcome natural physiological reproductive or recombination barriers and that are not techniques used in traditional breeding and selection. (Article 3.i)

(Thus, living modified organisms may be seen as a subset of genetically modified organisms. They do not include genetically modified organisms that are not "living", such as genetically modified peanut butter or canola oil.)

Environmental concerns about living modified organisms typically focus on the risks of these organisms "escaping" into and (perhaps, irreparably) damaging the environment (including biodiversity)[3] In a recent report, the Senate Committee on Community Affairs identified the following risks of biotechnology:

cost of "invasive" species entering the United States at US$138 billion a year (Mumford 2000, p.1).

3 The major focus of the public debate over genetically modified organisms (including living modified organisms) in Australia has been the possibility of human health consequences of eating genetically modified foods over long periods (Dolling and Peterson, 2000).

> ... contamination of traditional or organic crops by neighbouring [genetically modified] crops; the inability to eliminate a [genetically modified organism] once it is released and found to have an adverse impact ... ; increased environmental damage due to increased use of chemicals; increased environmental competitiveness of [genetically modified organisms] creating weeds, in the case of plants, or pests, in the case of animals; insect-resistant crops adversely affecting non-target insects ...; the transfer of genes for herbicide tolerance from [genetically modified] crops to related species resulting in herbicide-resistant weeds. (SCCA 2000, pp. 17-18)

That said, it is not clear that trade in living modified organisms presents a significant threat to biodiversity. Nor is it clear why a distinction should be made between the threat presented by importing living modified organisms and that by domestically developed (and released) living modified organisms.

Is the Protocol cost-effective?

There are several aspects of the Protocol, which could potentially undermine its ability to meet its stated objective in a least cost manner.

Definition of living modified organisms

There are at least two concerns with the Protocol's definition of living modified organisms. First, it implies that it is modern biotechnology that poses the primary risk to biodiversity. However, novel organisms created by traditional breeding and selection techniques may also pose an equivalent risk (Isaacs and Phillips 1999, p.5). And yet these organisms are not subject to the Protocol's provisions. And, second, because it is technology-specific, the definition may become out of date and, thus, not cover future gene technologies that may pose risks to biodiversity.

Import decision making provisions

Different approaches for different living modified organisms

The Protocol's import decision making provisions differ depending on whether the import is of living modified organisms for intentional introduction into the environment (LMO-E) — for example, seeds for propagation, seedlings and fish for release — or of living modified organisms intended for direct use as food, feed or for processing (LMO-FFP). (Further distinctions are made between living modified organisms in transit, destined for "contained use" and identified in decisions by the Conference of Parties.) The provisions governing imports of LMO-E (described

collectively as the "advance information agreement"), when compared with that applying to LMO-FFP, appear to impose greater obligations on the parties and on exporters (including exporters from non-parties — see later).

There are two concerns about this dual approach. First, it implies that LMO-E and LMO-FFP are different in terms of the risks they pose to biodiversity. However, it is not readily apparent that this is the case. Second, although it is clear that the Protocol requires parties to base their decisions about imports of LMO-E on risk assessments, the same cannot be said in relation to imports of LMO-FFP: there is some ambiguity here. If there is no requirement for a risk assessment in relation to LMO-FFP, there is a danger that parties can apply measures to restrict trade in these types of living modified organisms inappropriately. One particular consequence of this is that producers may be denied opportunities to improve their productivity and output range through the use of living modified organisms (see box 1 and below).

Box 1 **The importance of biotechnology for agriculture**

Technological change — whether it involves new improved varieties, new and more efficacious crop protection chemicals, or new and more efficient farm equipment — has been a fundamental driver of growth in agricultural output (see attachment A, figures 2 and 3). With continuing declines in land availability in Australia for agriculture (see attachment A, figure 1), technological change offers the main prospect of maintaining and increasing output.

Biotechnology (including gene technology) has the potential to achieve increases in agricultural output. It can do this through improvements to productivity (by lowering input costs and increasing yields) and by increasing the range of products available (novel products and new varieties/hybrids). In relation to plants, common goals of genetic modification include herbicide tolerance, resistance to the attack of insects, resistance to infection from viruses, increased yield in food crops, drought resistance and salinity tolerance (SCCA 2000, p.13 and attachment A, table 3).

Although still in its infancy, the application of biotechnology to agriculture is occurring at an increasing rate and becoming more widespread. This can be seen in relation to genetically modified crops. The number of countries growing genetically modified crops has increased from one country (the United States) in 1992 to 12 countries (including Australia) in 1999. In the United States, the 'biotechnology' shares of total land for growing corn, soybeans and cotton are now 25, 54 and 61 per cent respectively. The global area of land devoted to the growing of genetically modified crops — soybeans, corn, rapeseed, potatoes, cotton and tobacco — has increased from 3 million hectares in 1996 to 42 million hectares in 1999; an increase of fourteen fold (attachment A, table 1). In 1999, country shares of the global area of land for genetically modified crops were 70 per cent for the United States, 14 per cent for Argentina, 10 per cent for Canada and the remainder for Brazil, China, Australia, South Africa, Mexico and Europe.

Source: Edwards (2000) and attachment A, tables 1-2 and figures 1 –3.

The precautionary principle

The Protocol allows importing parties to apply the precautionary principle in relation to both LMO-E and LMO-FFP:

> Lack of scientific certainty due to insufficient relevant scientific information and knowledge regarding the extent of the potential adverse effects of a living modified organisms on the conservation and sustainable use of biological diversity in the party of import, taking also into account risks to human health, shall not prevent that party from taking a decision, as appropriate, with regard to the import of the living modified organisms … in order to avoid or minimise such potential adverse effects. (Articles 10.6 and 11.8)

The onus of seeking a review of any decisions based on the precautionary principle rests with the exporting party or exporter: the importing party is under no obligation to initiate a review of its decisions (article 12.2). The Protocol uses one definition of the precautionary principle, which does not have universal acceptance.

Setting aside the legal uncertainty created by a possible inconsistency between these provisions and article 5.7 of the SPS Agreement (this is dealt with later), the absence of disciplines in the Protocol on the use of the precautionary principle is a major concern. For instance, there are no disciplines on parties restricting the length of time that measures are to apply or that relevant scientific information be sought in the future.

Accordingly, there is potential that, because of a "lack of scientific certainty due to insufficient relevant scientific information", inappropriately restrictive measures would be placed on imports of living modified organisms. These measures could unnecessarily delay or, at worst, permanently deny producers opportunities to improve their productivity and output range as well as deny final consumers the benefits of this increase (including wider choice and lower priced products).

Where possible, parties should be encouraged, through the Conference of Parties, to consider a phased approach to imports in this situation. This might, for example, involve:

(i) the release of living modified organisms in increments under controlled (or quarantined) conditions followed by;

(ii) the gradual relaxation of restrictions on imports if there is no concrete evidence of adverse environment effects after a specified time.

Such an approach would enable producers to acquire progressive productivity improvements while minimising the risks of adverse effects on biodiversity.

Socio-economic considerations

The Protocol allows parties in making an import decision to take into account:

> … socio-economic considerations arising from the impact of living modified organisms on the conservation and sustainable use of biological diversity, especially with regard to the value of biological diversity to indigenous and local communities (article 26.1).

A particular concern about this provision is the breadth of discretion it gives to importing parties in making decisions about the grounds for restricting trade. No definition of "socio-economic considerations" is given. Nor is there any guide on how significant these considerations must be to affect import decision making. Phillips and Kerr (2000, p.78) comment

> "The BSP's provision relating to taking account of socio-economic factors in the regulation of imports is in direct conflict with a central tenet of the WTO…One is left wondering if this is, again, an attempt to obtain protection on this account through the back door when it could not be obtained through the WTO."

Handling, transport, packaging and identification requirements

The Protocol requires parties to take necessary measures to require that trade of living modified organisms is handled, packaged and transported under "conditions of safety", taking into account international standards (article 18.1). There is little detail, however, on what these measures might involve: this is left for the Conference of Parties to determine (article 18.3). Nonetheless, these measures have the potential to add significantly to the costs of trade, particularly if they necessitated the introduction of "identity preservation" systems such as the mechanical segregation of living modified organisms from non-modified products (for example, EU 2000 contains considerable cost data on these systems).

The Protocol also requires parties to take measures governing the "documentation accompanying" imports (article 18.2). The documentation must "clearly" identify that there are living modified organisms as well as contain other specific information. (These identification requirements are perceived by some commentators as mandatory labelling: for example, Phillips and Kerr 2000, pp. 73-74.) However, the requirements differ according to three broad classes of living modified organisms: LMO-FFP; living modified organisms for contained use; and LMO-E and other living modified. For example, in relation to LMO-FFP, the accompanying documentation must specify whether the import "may contain' living modified organisms, but the same requirement does not apply to the other specified classes of living modified organisms (article 18.2.a). It is not clear what the rationale for these distinctions is; indeed, it appears that it would be more cost-

effective if the requirements were the same, regardless of the class of living modified organism. In any event, such identification requirements are likely to add to the costs of trade.

Requirements to provide information to a Biosafety Clearing House

The Protocol requires parties to publish relevant laws, import decisions and risk assessments relating to living modified organisms in a Biosafety Clearing House (mainly article 20).

Making such information of national regulatory regimes transparent can mitigate the costs to parties, particularly developing country parties, and to exporters and importers. For example, parties can 'learn' from other parties' regulatory/risk assessment experiences.

The "modalities of the operation" of the Biosafety Clearing House are left for the Conference of the Parties to determine. In deciding upon the format and level of detail of information to be provided by the parties, a guiding principle should be to balance the value of the information to users against the compliance costs to parties in providing it. Otherwise, there is a danger that the supply of information is either 'overdone' or of poor quality, particularly relative to parties' compliance cost.

In this regard, the transparency provisions of the WTO SPS and TBT Agreements -- particularly, provisions which overlap with those of the Protocol --- should be a relevant consideration in deciding the format and level of information to be provided to the Biosafety Clearing House. If there is overlap, (as there is, for example, in relation to notifying the relevant body of import measures) the overall burden of compliance amongst WTO members who are parties to the Protocol will be greater for little gain in information value. In this situation, coordination between the Convention on Biological Diversity Secretariat (which presumably will administer the Biosafety Clearing House) and the WTO secretariat would be desirable.

The Protocol's uncertain relationship with the SPS Agreement

The Discussion Paper states that, on the basis of a legal analysis prepared by DFAT (with the assistance of the Australian Government Solicitor) the Protocol and WTO agreements "should be seen as complementary, and not competing regimes for the management of trade in [living modified organisms]" and "there is nothing in either ... which would appear to conflict with the other" (p. 9).

Despite this statement, other commentators consider that there is legal uncertainty, or worse, regarding the relationship between the two treaties (eg Aerni 2000, p.15, Cosbey and Burgiel 2000, pp.3-4, Phillips and Kerr 2000, pp. 63-75 and Cors 1999, p.1/2).

One concern relates to jurisdictional responsibility, particularly where there are conflicting rules. As the Protocol is a more recent treaty than that establishing the WTO, it could be argued that it has precedence for members of both treaties. However, as Phillips and Kerr noted, even the WTO Committee on Trade and Environment has not yet been able to clarify this issue (2000, pl.65).

An example of the potential for conflict relates to articles 10.6 and 11.8 of the Protocol and article 5.7 of the SPS Agreement. These provisions relate to the role of the precautionary principle in setting import measures. However, the SPS Agreement gives very limited scope for WTO members to apply the precautionary principle.

Legal uncertainty is only likely to be resolved by way of disputes, whether before the WTO Dispute Settlement Body or by way of the dispute settlement mechanism contained in the Convention on Biodiversity. To the extent that the text in the Protocol has contributed to legal uncertainty and prompted disputes, this needs to be counted as a cost.

What if Australia does notsign and ratify the Protocol?

The Protocol is to enter into force after 50 countries have signed and ratified it (article 37).

To date, 78 countries have signed the Protocol, with only one country, Bulgaria, ratifying it (CBD Secretariat 2000). The signatories include Argentina, China, European Community, New Zealand and Venezuela. Japan and the United States (as noted earlier a significant producer of genetically modified crops) are not signatories. (As the United States is not a signatory of the Convention on Biological Diversity, it cannot sign on to the Protocol.)

Although the Protocol does not prohibit trade in living modified organisms between parties and non-parties, it does require of parties that:

- such movements be consistent with the objective of the Protocol; and
- they “encourage” non-parties to adhere to the Protocol (article 24).

Accordingly, even if Australia does not sign and ratify the Protocol, it is still likely to be affected by it, if enough other countries ratify and so bring the Protocol into effect. Australian exporters seeking to export living modified organisms to countries who are parties will be affected. They are likely to be required to comply with the Protocol's provisions governing import decision making (eg in relation to LMO-Es, requirements to notify the importing party of intention to export and to carry out risk assessments for the importing party) as well as with handling, transport, packaging and identification requirements. On the other hand, it is unlikely that Australian importers of living modified organisms would be affected by the Protocol, as existing domestic regulation would apply. (This might not be the case if Australia unilaterally amended its domestic regulation to be more consistent with the Protocol.) However, other countries may demand to know if imported living modified organisms such as genetically modified feed-meal were used in Australian products such as meat and aquaculture products for Australian export.

Concluding remarks

While there are many points of concern about the ratification of the Protocol, one of the most fundamental is the 'target-instrument' question. Good public policy making requires that regulation be clearly targeted to address a clearly identified problem and should be the most cost-effective means of resolving that problem. It is arguable that trade in living modified organisms is a very minor threat to biodiversity, even in developing countries which do not have sophisticated domestic protective measures such as Australia has. As Phillips and Kerr (2000) conclude, the Protocol seems to have much more to do with restricting and hampering trade in genetically modified products, for other reasons, than with protecting biodiversity.

Attachment A

Table 1 **Genetically modified crop area by country**

million hectares

Country	*1996*	*1997*	*1998*	*1999*
USA	1.45	7.16	20.83	28.64
Argentina	0.05	1.47	3.53	5.81
Canada	0.11	1.68	2.75	4.01
China	1.00	1.00	1.10	1.30
Brazil	0.00	0.00	0.00	1.18
Australia	0.00	0.20	0.30	0.30
South Africa	0.00	0.00	0.06	0.18
Mexico	0.00	0.00	0.05	0.05
Europe	0.00	0.00	0.002	0.01
Total	2.61	11.51	28.622	41.48

Source: EU (2000)

Table 2 **Genetically modified crop area by crop**

million hectares

Crop	*1996*	*1997*	*1998*	*1999*	*2000*[a]
Soybeans	0.45	5.04	13.59	21.78	22.49
Corn	0.30	2.61	9.11	11.28	10.53
Rapeseed	0.11	1.42	2.43	3.46	3.12
Potatoes	0.01	0.01	0.03	0.04	0.04
Cotton	0.73	1.43	2.46	3.92	4.90
Tobacco	1.00	1.00	1.00	1.00	1.00
Total	2.60	11.51	28.62	41.48	42.08

a Forecast.

Source: EU (2000)

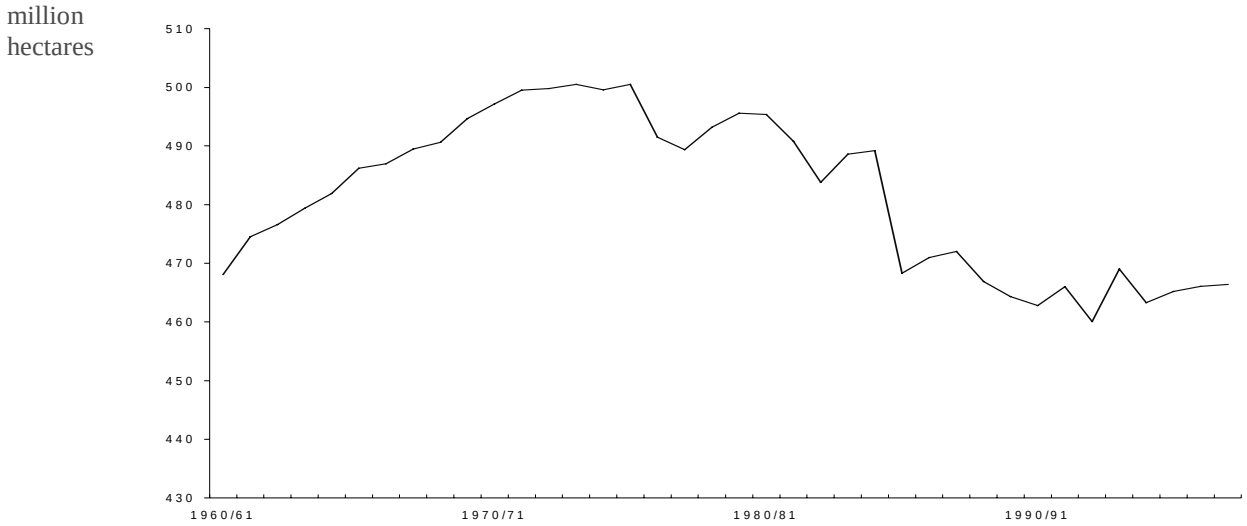
Table 3 **Principal traits in genetically modified crops in 1999**

Trait	*Contribution to global area growth between 1998 and 1999*
	Per cent
Herbicide tolerance	69
Herbicide tolerance and insect resistance	21
Insect resistance	10
Virus resistance	-
Quality[a]	-
Total	100

a For example, nutrition and appearance.

Source: James (2000)

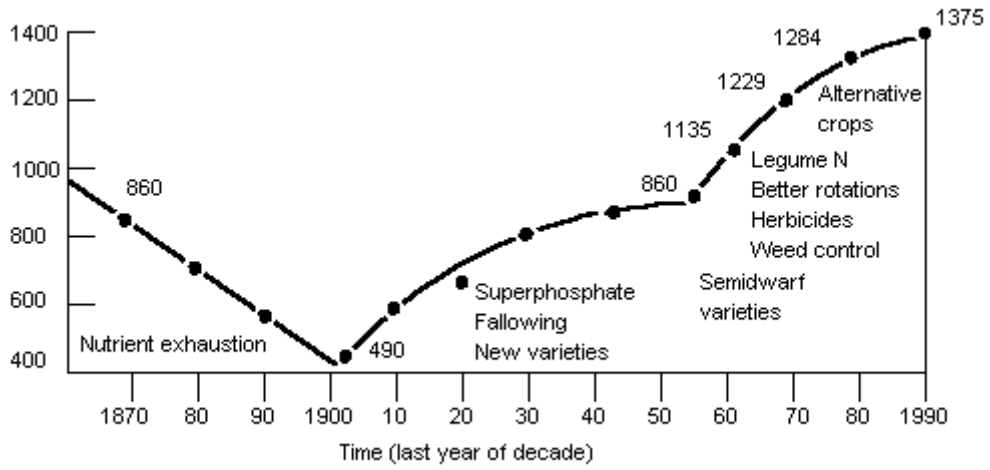
Figure 1 **Total area of farm land in Australia, 1960/61 to 1998/99**[a]
million hectares



a Farm land area is used for wheat, other crops and sown pastures and grasses.

Source: Australian Commodity Statistics (1999, p. 24).

Figure 2 **Average wheat yields since 1870**[ab]
mean decennial yield: kilograms per hectare per year

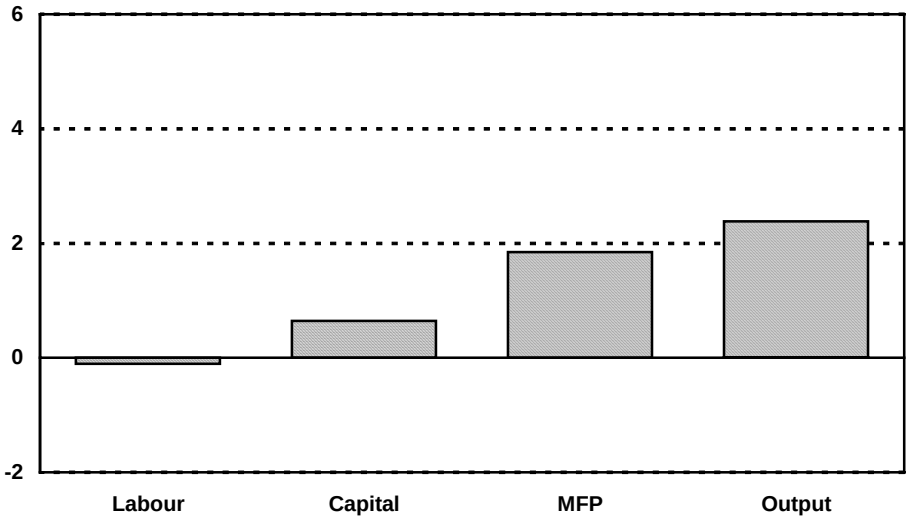


a The estimates shown relate to the average yield over the decade ending in the years shown. **b** The analysis is based on average yields over the 140 year observation period. As wheat production commenced in some of the higher yielding areas and has progressively expanded into lower yielding areas, the estimates of productivity growth understate the productivity gains obtained in individual regions from changes in technology and improved land management.

Source: Gretton and Salma (1996, p. 7).

Figure 3 **Contributions to average annual growth in real output by the agriculture, forestry, fishing and hunting sector,**[ab] **1974–75 to 1997–98**

percentage points



MFP Multi-factor productivity

a Labour is measured by total hours worked.

b Multi-factor productivity is estimated by subtracting from output growth the contributions due to labour and capital. It reflects the impact of technological change on output growth.

Source: Commission estimates based on ABS data.

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