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SOME TOPICS ON QUERCETA ILICIS COENOSSES AND THEIR DEGRADATION FORMS IN ITALY

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This review of research activities reports on the planning and the first results of a series of studies on the *Quercus ilex* communities in Italy. Particularly examined is the situation of the »Tre Venezie« country which is at the border of the area of *Quercus ilex* and its vegetation.

Introduction

A large part of peninsular Italy, at least if we restrict ourselves to the coastal areas, is part of the Mediterranean floristic-phytogeographic area. Nevertheless very few studies have been carried out on the climatic formation of this territory: the holm-oak woods. At two recent meetings in Lecce (1984) and Cagliari (1985), new elements of *Querceta ilicis* in Italy were made known. However, it emerged again that even though the amount of data on these vegetational types has increased, we are still a long way from having a good knowledge of Italian holmoak woods. This seems even stranger if we consider that Italy is in the centre of the distribution area of the holm-oak (*Quercus ilex* s.s.) and that on Italian territory the holm-oak occupies an area with a longitudinal extension of approximately 800 km (from Leuca Cape to Ventimiglia) and a latitudinal extension of approximately 1,100 km (from Cape Passero to the lower Val d'Adige).

Another problem which emerged from the two above-mentioned meetings is that Italian researchers have not produced a single model for syntaxonomic classification. There are some researchers who refer to the classic model proposed by Braun-Blanquet et al. (1952), others who use the classification system proposed by Rivas-Martinez (1974), and others again who prefer to refer to Slavic or Middle-east

authors. Finally, there are some who propose new syntaxonomical systems, referring however to individual situations or such as cannot be used as a rule for the whole of Italy. In any case the results obtained do not appear to satisfy, either partly or completely, and there is a diffused feeling that there are still many things to be clarified and that perhaps it is a little premature to pose the problem of the best syntaxonomic model to adopt for Italy: the most important thing is that there should be one model only for everybody even if it is provisional, insufficient and unsatisfactory, but one which will enable us to obtain visible results and which will allow us, in the end, to reach a better understanding of the problems.

It is with this idea in mind that a group of Italian researchers who have been concerned with vegetational problems or Mediterranean bioclimatics for many years, has decided to start a common research programme of national interest on Mediterranean evergreen vegetation, intending to survey both the coenosis of *Querceteta ilicis* and those of its degradation forms such as *Cisto-Lavanduletea* and *Ononido-Rosmarinetea*. The group, co-ordinated by Prof. E. Poli of Catania, and which includes researchers from the Catania, Bari, Cagliari, L'Aquila, Genoa and Padua centres, has come to an agreement to use the model proposed by Braun-Blanquet for the moment. At present they are surveying the various areas of Mediterranean Italy, trying to take the most dissimilar situations in order to have the most representative and complete variety of situations possible. The most typical Mediterranean situations can be found in Sicily, in Puglia as regards eastern aspects, and in Sardinia as regards western aspects. In Lucania and in Calabria research is being carried out on holmoak forests at their altitudinal limit.

The coenosis at the limits of the Mediterranean area is being studied in Liguria as regards the western sector and in Venezia Giulia for the eastern sector, while in the Veneto region holm-oak woods or their remains are being investigated outside the limits of the Mediterranean area (Fig. 1).

The group from Padua fits into this research project with surveys carried out in »Puglia« and in the »Tre Venezie« regions.

PUGLIA — For many years the Geobotanic Section of the Department of Biology of Padua has been carrying out floristic-vegetational studies in two areas of Puglia: the Gargano and the Salentine Peninsula. The object of these studies is the Mediterranean evergreen vegetation in its composition and dynamics, both as purely cognitive and applicative facts. If we add to this those eastern characteristics which distinguish the flora and vegetation in Puglia from analogous Italian situations, the choice of this territory would appear quite logical.

In particular the studies which have been in progress for about 20 years (Chiesura Lorenzoni et al. 1971; Curti et al. 1976; Caniglia et al., 1984) have pointed out the presence of a complicated syntaxonomic problem in the Salento area, linked to holm-oak woods (*Quercus ilex*), to spiny oak woods (*Q. coccifera* s. l.), to »fragno« woods (*Q. trojana*) and to their forms of degradation or substitution. The classification obtained following the syntaxonomy proposed by Braun-Blanquet et al. (1952) proved to be difficult and unsatisfactory for all these vegetational types, but the classification using other models such as those proposed by Balkan authors (Horvatić 1958, 1961/62, 1963, 1964), Middle eastern authors (Nahal 1962, Zohary et Orshan 1958—59) and Iberian authors (Rivas-Martinez 1974) were even less productive or almost impossible to use.

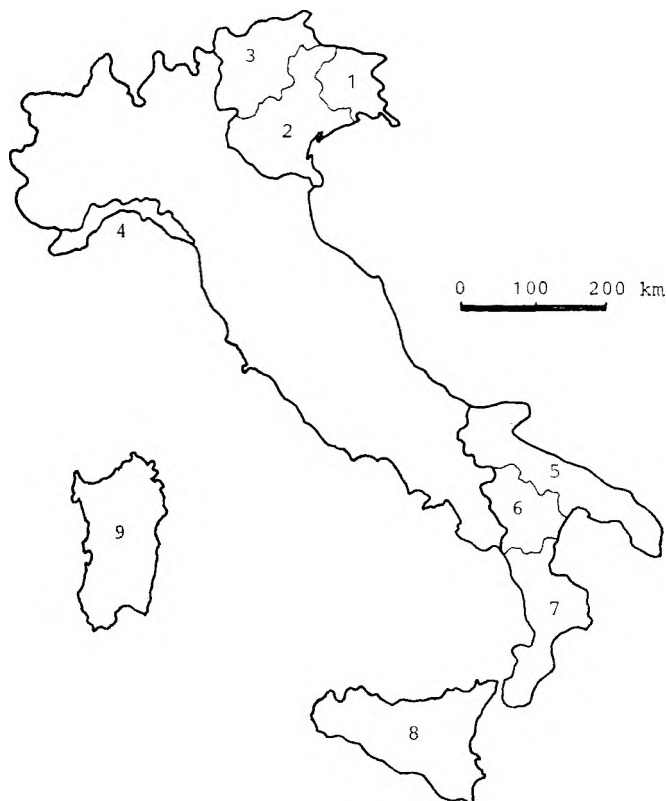


Fig. 1. The localities in which holm-oak forest are investigated:
 1 Friuli Venezia Giulia — 2 Veneto — 3 Trento — 4 Liguria — 5 Pu-
 glia — 6 Lucania — 7 Calabria — 8 Sicilia — 9 Sardegna

Those who participated in the field-trip near Lecce were at least in part able to realize the difficulties met by many in accepting the classification of the *Quercus coccifera* s. l. woods in the alliance *Quercion ilicis*, in spite of the fact that the floristic retinue present left no doubts on this interpretation. They could also ascertain the small number of present species in the pure holm-oak woods of Rauccio. In both cases the forms of degradation were shifted towards more thermoxerophile situations, making one consider the climacic stage as something different from *Quercion ilicis*, that being either *Oleo-Ceratonion*, *Pistacio-Rhamnetalia alaterni* or *Quercetea calliprini* according to the model one wishes to follow. This has been justified by many by the fact that southern Salento is on the edge of two bio-climatic regions; the meso-mediterranean plain in its most thermophile aspects with climax vegetation of *Quercion ilicis*, and the thermo-mediterranean plain with climax vegetation of *Oleo-Ceratonion*. In this area of tension, closed formations tend towards *Quercion ilicis*, while the more open ones tend towards *Oleo-Ceratonion*. Therefore with the destruction of holm-oak forests, the substitute vegetation at first would be classifiable with *Oleo-Ceratonion* s. l., while later, with the reconstruction of the forest, the most thermo-

phile species would be relegated to the edges, and it can sometimes happen that one of them, *Quercus coccifera* s.l., substitutes the holm-oak in the arboreous layer (Chiesura Lorenzoni et al. 1974).

Another problem concerning the Mediterranean evergreen coenosis in Puglia is the taxonomic problem relative to some of its components which are either characteristic or significant species.

As an example, we would like to recall the problem of the spiny oak (*Quercus coccifera* or *Q. calliprinos*) or that inherent to the group *Rubia peregrina* (Cardona et Sierra Raflos 1981).

TRE VENEZIE — The choice of this territory is due to the fact that within it there are some holm-oak sites of a residuous origin situated at the limit of the species'area.

Although there are some small holm-oak woods outside of the proper Mediterranean area, we thought it would be interesting to study these coenoses in order to understand and interpret the historic dynamism and the potential of these vegetal forms and those close to them both spatially and syntaxonomically. A similar study was carried out in the north-western sector of Italy, in Liguria, by a group from the Botanical Institute of Genoa, coordinated by Prof. S. Gentile.

The sites in the Tre Venezie regions are in the Trentino region, in the Sarca Valley on the lower stretch of the Val d'Adige, in the Friuli region, along the coast, and Euganean Veneto with the following distribution:

1) Benacensi sites — on the eastern side of Garda Lake and continuing northwards to the Trentino sites;

2) Coastal sites — on more or less ancient stretches of dunes along the whole arc of the Venetian lagoon: Rosolina Mare, Donada, Bosco Nordio, Caorle, Mouth of the Tagliamento river;

3) Euganean sites — on the homonymous hills.

Since the stations in Venezia Giulia are along the Trieste coast and are considered to be a western projection of the Istrian coenosis, it has been thought that they should be treated together, and while waiting for agreement from our Yugoslav colleagues for a common study, this research has been set aside. However, at present the Euganean Veneto sector has been privileged, with reference to the Tridentina area connected to it (Fig. 2).

Benacensi sites

A) Garda Lake

No phytosociological information is available for this area at present, only floristic data collected in holm-oak coenoses or dynamically connected to the latter.

a) Rocky holm-oak sites — especially typical of the lower Val d'Adige, but also present along the eastern coast of Garda Lake. These are populations of *Quercus ilex*, sometimes accompanied by *Centranthus ruber*, *Cotinus coggygria* and numerous chamaephytes and haerbaceous species typical of the rocky coenoses. In this case the holm-oak is a companion species in a syntaxonomic context, different from *Quercetea ilicis*.

b) Holm-oak woods — Arboreous species present besides the holm-oak are: *Fraxinus ornus*, *Celtis australis* and *Laurus nobilis* about whose origin however there are doubts. In the shrub layer the following

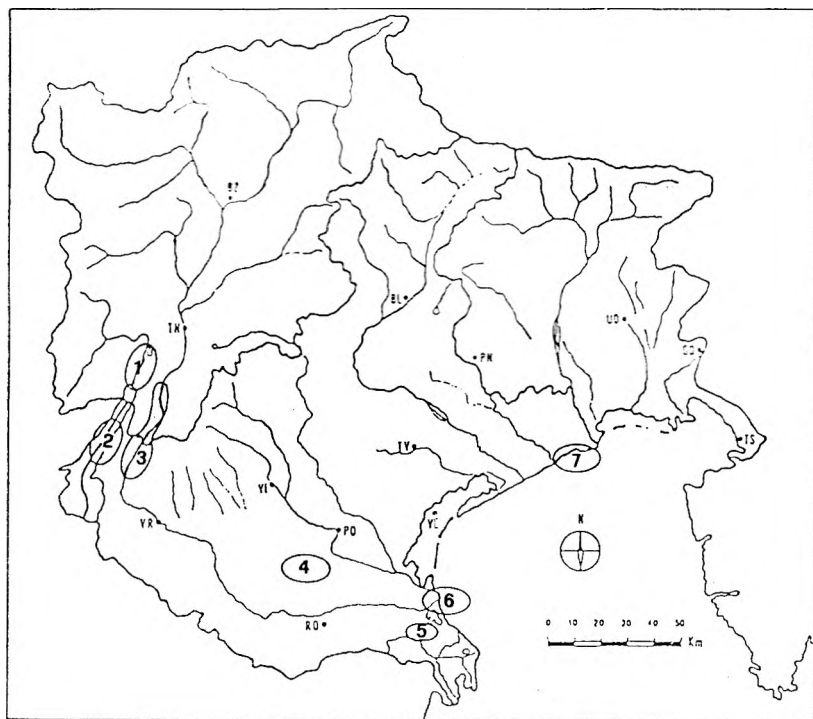


Fig. 2. The localities in Veneto and Trentino which are under investigation: 1 Sarca Valley — 2 Garda Lake — 3 Bassa Val d'Adige — 4 Colli Euganei — 5 Donada e Contarina — 6 Rosolina mare-Porto Caleri 7 — Caorle e Bibione

species are present: *Cercis siliquastrum*, *Phillyrea latifolia*, *Pistacia terebinthus*, *Coronilla emerus*, *Ruscus aculeatus*. The herbaceous layer is made up of *Coronilla scorpioides*, *Limodorum abortivum*, *Euphorbia nicaeensis*, *Argyrolobium zanonii*, *Centranthus ruber*, *Convolvulus cantabrica*, and others, a group of species which would appear to be linked to the inconsistency of the stony, chalky and crumbly substrata, even if covered by a layer of humus and litter, rather than to the holm-oak coenosis. The Mediterranean qualities of the holm-oak are supported by the presence of other Mediterranean elements such as *Rhamnus alaternus*, *Erica arborea*, *Cistus albidus* and *Spartium junceum* (cultivated and naturalised) in the nearest coenosis shrubs which are considered its seral stages. Further investigations being carried out at present could clarify the synsystematic position of this coenoses. Floristic surveys of a bibliographical nature have also been carried out (G o i r a n 1897—1904, B e g u i n o t 1924) in order to ascertain whether some elements of the *Quercetea ilicis* or species which represent its degradation series exist in this area even if they are disassociated. Apart from the types already mentioned which are considered to be characteristic of the *Quercetea ilicis* or of the individual types comprised within it, the following species can be found in the area: *Asparagus acutifolius*, *Rubia peregrina*, *Epipactis microphylla*, *Lathyrus latifolius* and *Asplenium onopteris*.

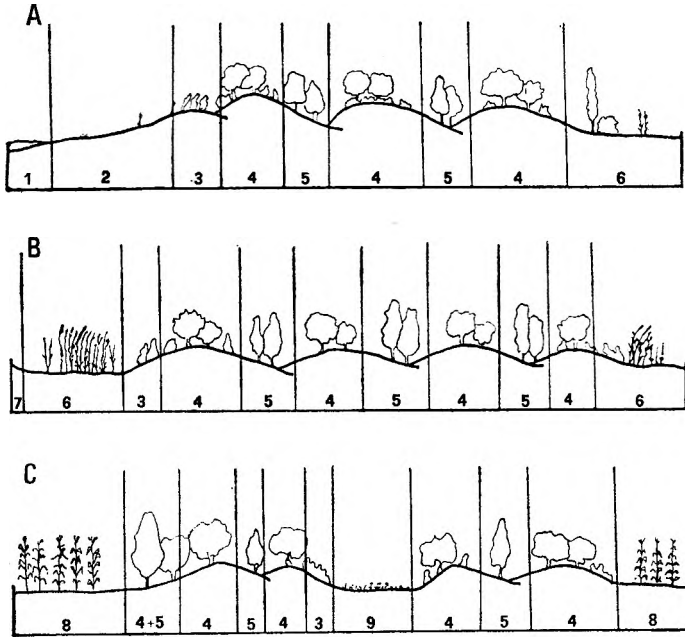


Fig. 3. Bosco Nordio: paleoseries scheme (A), mesoseries (B) and recent series (C) vegetation scheme:
 1 sea — 2 psammophilic vegetation — 3 facies of *Juniperus* — 4 *Quercion ilicis* — 5 *Querco-Fagetea* — 6 hydrophitic vegetation — 7 recent dune — 8 agricultural surfaces — 9 non cultivated areas

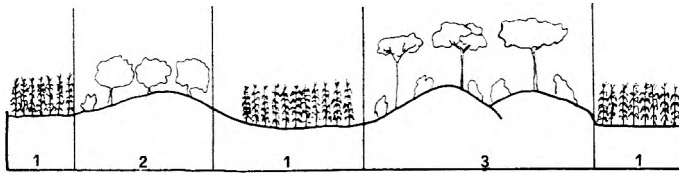


Fig. 4. Donada — fossil dunes, vegetation scheme:
 1 agricultural surfaces — 2 holm-oak forest — 3 plantations with the species *Pinus pinea*

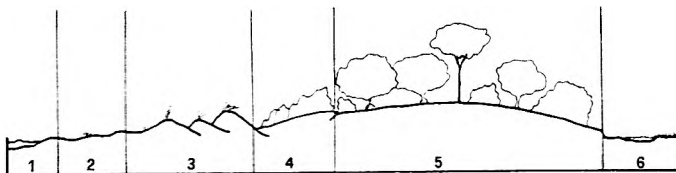


Fig. 5. Vegetation series scheme on the dunes in the locality Rosolina mare:
 1 sea — 2 *Cakiletea* — 3 *Ammophiletea* — 4 *Junipero-Hyppophaëtum fluviatilis* — 5 *Quercion ilicis* — 6 lagoon

B) Sarca Valley — Arco (TN) — Southern Trentino

In this area there are some holm-oak woods consisting of a small number of species, especially of *Quercetea ilicis* (only *Quercus ilex* and *Pistacia terebinthus*). It would appear to be a sub-association *quercetosum ilicis* of a sub-mediterranean deciduous wood.

Coastal sites

A) Bosco Nordio

In this ancient dunal complex situated between the Venetian lagoon and the mouth of the Adige river, there is an alternation of two vegetational types: the holm-oak wood in the higher areas and the deciduous hygrophytic oak wood of *Quercus robur* in the inter-dunal subsidence. This leads to the inter-penetration of elements from one type into the vegetation of the other and to the difficulty in separating the two kinds when surveying. This has induced some authors (Pignatti 1959, Corbetta 1972, Lorenzoni 1978) to accept the idea of classifying these coenoses in the *Orno-Quercetum ilicis*, but at present this classification, which others (Gehu et al. 1984) object to, would not appear correct. It is a question of a fragmentary *Quercion ilicis* s. l. in a tense phase at the limits of or outside the alliance area. For the past, a palaeoseries and a mesoseries to which the present succession of the vegetation is contrasted, has been suggested (Fig. 3).

B) Donada

These sites are more towards the interior and to the south of Bosco Nordio, isolated from the sea by cultivated land, a stretch of lagoon and the dunes of Rosolina Mare.

The holm-oak wood on these ancient dunal stretches is lacking in species, on average nine per survey. *Quercus ilex* is present in all three vegetational layers with the following values as percentages of covering: Layer A = 70%, Layer B = 20%, Layer C = 10%. Other species of *Quercetea ilicis* present are: *Ruscus aculeatus* (V⁻³), *Clematis flammula* (II), *Asparagus acutifolius* (I) and *Rubia peregrina* (I).

The most remarkable thing to point out is the strong reproductive potential of *Quercus ilex*, to such an extent that its renewal is abundant both in the holm-oak woods and in the neighbouring pine woods. The outline of the present vegetational series is shown in Figure 4.

C) Rosolina Mare — Porto Caleri

On the recent dunes which stretch from the mouth of the Adige to the lagoon at Porto Caleri, there is a holm-oak wood in which a re-forestation of pines (*Pinus pinea*, *P. pinaster*, *Pinus brutia*) has been carried out. The surveys carried out show a predominance of species foreign to *Quercetea ilicis*, among which there are many of the *Quercetum-Fagetum* species. In this case too, the attribution to *Orno-Quercetum ilicis* appears to be a little hasty, and for the moment the fragmentary *Quercion ilicis* s. l. can be considered. In the vegetational series (Fig. 5) a interesting shrub vegetation has been described: *Junipero-Hippo-*

phaëtum fluviatilis Gehu et Scoppola 1984, all. *Pruno-Rubion ulmifolii* Bolos 1954, *Prunetalia spinosae*, *Quercu-Fagetea* in which some species of *Quercetea ilicis* are still present (Gehu et al. 1984).

D) Caorle — Bibione

The sites are situated on the coast between the Sile and Tagliamento rivers. At present no phytosociological material is available for this area which would appear to be similar to the situation at Rosolina and Bosco Nordio, even if more deteriorated.

From the bibliography (Beguinot 1941) the following species of *Quercetea ilicis* result as being present in the area: *Phillyrea angustifolia*, *Asparagus acutifolius*, *Rubia peregrina*, *Smilax aspera*, *Clematis flammula*, *Lonicera etrusca*, *Teucrium flavum*, *Osyris alba* and also *Cistus incanus* and other species of the degradation series of the holm-oak wood.

Euganean sites

Phytosociological data is not yet available, also because the Mediterranean species present, almost certainly tertiary residues (Trotter in Arietti 1965) are often disassociated. The holm-oak tends to locate in rocky aggregations, while the most Mediterranean vegetational aspects are made up of a regressive successional scrub of *Erica arborea*, *Cistus salvifolius* and *Arbutus unedo* (Beguinot 1909).

Conclusion

As can be seen, the Italian Mediterranean evergreen coenoses present a complex problem. As regards the Veneto region, apart from syntaxonomic aspects common to similar coenoses in other parts of Italy, their origin and significance in the present vegetational context are still to be classified. Now, in particular the situations which can definitely be connected to those in Istria and in the Dalmatian coast, i. e. the coenoses in the Trieste coast, are still to be clarified. In order to do this, collaboration of our colleagues at the University of Zagreb is needed. Contact has already been made and joint research into some of the coenoses can clarify and verify the similarities and differences between the two transadriatic situations.

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SAŽETAK

PROBLEMATIKA ZAJEDNICA RAZREDA *QUERCETEA ILICIS* I NJIHOVIH
DEGRADACIJSKIH OBLIKA U ITALIJI

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Italija se nalazi u centru areala česmine i veliki dio teritorija predstavlja klimaks vegetacije česminovih šuma.

I unatoč tome fitocenološke spoznaje o tim zajednicama nisu još dovoljne da bi omogućile sastavljanje pregledne tablice koja bi vrijedila za cjelokupno područje Italije. Zbog toga je osnovana skupina istraživača koja se bavi ne samo zajednicama razreda *Quercetea ilicis* već i oblicima njihove degradacije (*Cisto-Lavanduletea* i *Ononido-Rosemarinetea*).

Mediteranska vazdazelena vegetacija proučavana je dakle u mnogim područjima Italije izabranim po kriteriju da predstavljaju sve ili većinu biljnogeografskih područja i staništa u kojima se mogu naći te zajednice. Najtipičnije mediteranske sastojine snimljene su na Siciliji, u Pugli i na Sardiniji. Zajednice česmine, na visinskoj granici, u Lukaniji i Kalabriji, u granicama geografske širine u Liguriji i Julijskoj krajini i konačno česminove šume ili ostaci česminovih šuma izvan mediteranskog pojasa u Venetu i Trentinu, proučavane su kao element za usporedbu.

U ovom radu predstavljena je problematika koja se odnosi na Pugliju i na tri Venecije koje su predmet proučavanja geobotaničke sekcije Biološkog odjela u Padovi.

U Pugli je uočena kompleksna sintaksonomska problematika vezana za šume česmine (*Quercus ilex*), hrasta oštrika (*Q. coccifera*), makedonskog hrasta (*Q. trojana*) i njihovih dinamičkih serija, uvjetovanih posebnim prilikama okoliša, za sadašnju sintaksonomiju razr. *Quercetea ilicis* koja nije najprikladnija i za taksonomske probleme koji se odnose na bitne komponente tih zajednica.

U sjeveroistočnom sektoru (Veneto, Trentino) istraživane su zajednice česmine i s nazočnošću česmine izvan sredozemnog područja. U najvećem broju slučajeva radi se o populacijama česmine na kamenjarskim površinama (niži dijelovi doline rijeke Adige) ili o šumama česmine u kojima je često jedina vrsta razreda *Quercetea ilicis* upravo sama česmina (jezero Garda, Donada), dok je preostala florna pratnja tipična za submediteranske šume listače. U drugim su slučajevima (Euganejski brežuljci) elementi vazdazelene makije brojniji ali razbacani, tj. ne tvore sastojine.

Bolja je situacija u primorskim česminovim šumama (Rosolina mare, Porto Caleri, Bosco Nordio) u kojima je još prepoznatljiva sveza *Quercion ilicis*, premda je i ona fragmentarno razvijena.

Staništa česminovih šuma u Julijskoj krajini, za koje se smatra da su povezana s istarskim, zasad su izostavljena zbog dogovora s kolegama sa Zagrebačkog sveučilišta o zajedničkom istraživanju.

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