Distribution and Migration of Posidonia Meadows as observed by Scuba Diving during 9 Consecutive Years in South-Eastern Elba (Italy)

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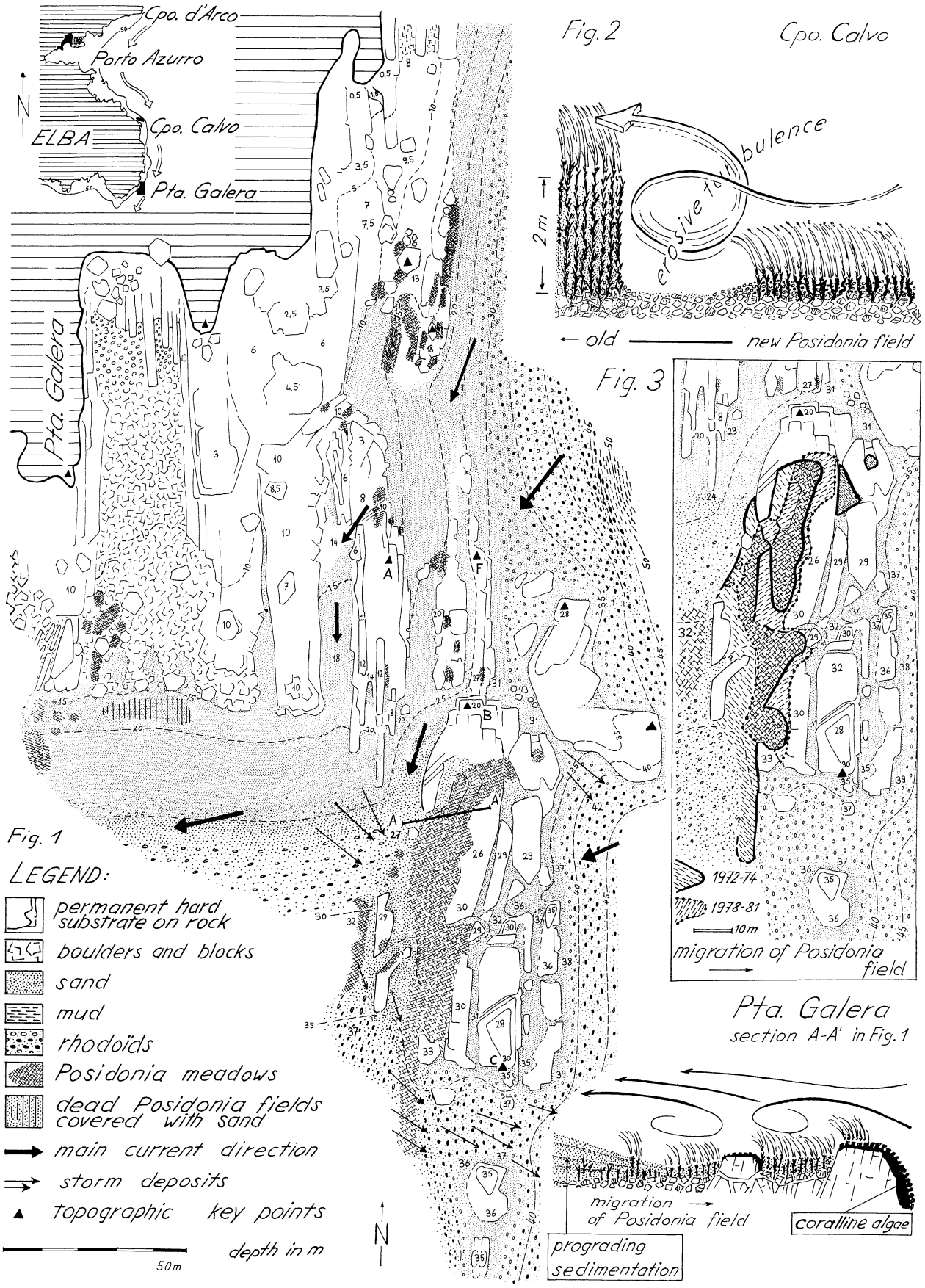
Resumé: L'implantation de nouveaux champs de Posidonia se fait exclusivement sur substrat dur, soit sur roche profondément fissurée soit sur un coralligène à surface irrégulière et caverneux soit sur des champs à blocs grossiers, dans des zones où l'eau est particulièrement turbulent. Pendant la croissance des champs, du sédiment fin est capturé par les rhizomes. Après le dépérissage d'un champ de Posidonia, une phase d'érosion doit enlever les sédiments accumulés afin que le substrat soit préparé pour une nouvelle implantation. Un tel cycle peut durer plusieurs décennies. De faibles déséquilibres entre les taux de croissance des rhizomes et de sedimentation sont compensés par une migration du champ d'un à plusieurs mètres par an.

The distribution of Posidonia fields as mapped in detail (fig.1) at Punta Galera below wave base depends evidently on zones of particularely turbulent water generated by the predominant current in the lee of topographic relief structures. New fields are implanted on particular substrates: deeply fissured rock, cavernous corallinacean cover (coralligène) or fields of coarse blocks or boulders moved only during decennial or centennial high energy events. Natural outcrops of Posidonia substrate created by particularely high water energy at Capo Calvo (fig. 2) show the mechanism that must take place in order to replace an old Posidonia field by a new one: The accumulated sediment trapped by the old, up to 3 m long rhizoms must be carried off in order to expose the original, hard substrate when new Posidonia is to settle again. Such cycles may take several decades to regain their starting point as demonstrated by dead Posidonia fields at Punta Galera.

In the Posidonia field there is an equilibrium between growth rates of the rhizoms and the sedimentation rate of particles produced in situ and/or carried along and cought in the network of the rhizoms. The limits of the fields reflect usually some desequilibrium in this respect. The latter is responsible for the migration of the field (fig. 3). At Punta Galera, below wave base, at 25 - 30 m depth, the migration rates of marked fields were measured to be one to several meters per year. The yearly progression of the fields constitutes an alternative average measure of productivity of Posidonia plants (compare Zieman & Wetzel, 1980). At Punta Galera, the migration of the field is directed perpendiculareley to the main current system over coralline substrate. Nothing is known yet about the evidently complex mechanism of competition for space between coralline algal and Posidonia meadows.

Reference: Zieman, J. C. & Wetzel, R. G., 1980: Productivity in Seagrasses: Methods and Rates. in Phillips, R. C. & Mc Roy, C.P. (ed.): Handbook of Seagrass Biology, p. 87-116 (Garland, New York, London).


Cpo. d'Arco
Porto Azurro
ELBA
Cpo. Calvo
Pta. Galera
N
Pta. Galera
Fig. 1
LEGEND:
permanent hard substrate on rock
boulders and blocks
sand
mud
rhodoïds
Posidonia meadows
dead Posidonia fields covered with sand
main current direction
storm deposits
topographic key points
depth in m
50m
Fig. 2
Cpo. Calvo
erosive turbulence
2m
← old
new Posidonia field
Fig. 3
1972-74
1978-81
10m
migration of Posidonia field
Pta. Galera
section A-A' in Fig. 1
migration of Posidonia field
coralline algae
prograding sedimentation