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OCCURRENCE OF *OCYPODE CURSOR* (LINNAEUS, 1758) (CRUSTACEA, DECAPODA) IN SALENTO (SOUTHERN ITALY)

SUMMARY

Ocypode cursor (LINNAEUS, 1758) is the only *Ocypode* species present in the Mediterranean Sea. It is widely distributed in the southern part of the basin (mainly African coast) and only recently it has been reported also from Sicilian Ionian sea. The present record is the first for Italian peninsula and the northernmost record of *O. cursor* in the Mediterranean Sea.

INTRODUCTION

The tufted ghost crab *Ocypode cursor* (LINNAEUS, 1758) is a semi-terrestrial burrowing brachyuran of nocturnal habits generally found in supratidal and intertidal sandy beaches (STRACHAN *et al.*, 1999).

The species is the only member of the family Ocypodidae occurring in the Mediterranean Sea; specifically, it is characterized by a disjoint distribution, comprising the eastern Mediterranean Sea and tropical coasts of the eastern Atlantic Ocean as far south as northern Namibia, with the exclusion of the western Mediterranean. The areal discontinuity is probably due by an invasion of the Mediterranean Sea during a warm interglacial period in the Quaternary, followed by a progressive disappearance of the species from the western areas of the basin due to the intra-glacial cold climatic conditions (SCHLACHER and LUCREZI, 2014).

Species of the genus *Ocypode* represent valuable ecological indicators of anthropogenic impacts on beach ecosystems (SCHLACHER *et al.*, 2016; GÜL

and GRIFFEN, 2019). Accordingly, in Europe *O. cursor* is included among the strictly protected faunal species in Appendix II of the Council of Europe's Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention; EC, 1982) and among the endangered or threatened species in Annex II of the Barcelona Convention (UNEP, 1976). The Mediterranean distribution range of the species is currently expanding from its original distribution in the southernmost sectors of the basin (e.g., the eastern ones: Israel, Turkey, and Egypt: GLAUBRECHT, 1992; TÜRELI *et al.*, 2014), with recent records reported in Malta and in Sicily (DEIDUN *et al.*, 2017).

Here, we report the occurrence of *O. cursor* along the Ionian coasts of the Salento Peninsula (Puglia Region, SE Italy), thus documenting the first and northernmost population of the crab in peninsular Italy.

RESULTS AND DISCUSSION

Ocypode cursor was found in a beach situated on the southern coast of the Salento Peninsula (SE Italy; 39°50'9.47"N, 18°13'26.97"E; Fig. 1) approximately 1.5 Km south of Torre Pali (LE). The beach is a gently sloping, exposed sand dune system, with a supratidal zone about 20-25 m wide, still maintaining the original geomorphological succession of deposit zones, embryonic, white, and grey dunes, retro-dune depressions and fixed dunes. To date, the beach is used for recreational activities, and during the summer experiences a considerable touristic pressure.

The first documented sightings were made in summer 2018 by one of the authors (F.B.), who observed several free *Ocypode cursor* specimens moving at dusk close to the shoreline. On September 22nd 2018, between 8.00 and 10.00 a.m., the beach (total length, 2100 m) was exhaustively inspected to find traces of the crabs. Burrows showing crab activities were found at distance of about 50 m from each other. One specimen was extracted from the respective burrow, identified, and photographed before release (data relative to the survey on the whole beach will be presented elsewhere).

The present study testifies the recent establishment of *Ocypode cursor* in the Salento Peninsula and, most importantly, represents the first record of the species in peninsular Italy. DEIDUN *et al.* (2017) provided an update of the species distribution in the central Mediterranean Sea in particular for Malta and Sicily. Since then, beside the present record the species was observed also in Tunisia in 2018 (KARAA *et al.*, 2019). GBIF (<https://www.gbif.org/>, accessed April 2019) includes records referring to the Levantine sector of the Mediterranean Sea in Turkey and Israel performed during the '70, and a non-confirmed record for Libyan waters. In general, considering the chronological succession of the records, it is apparent that the species has

widened its geographic distribution - originally limited to the eastern Mediterranean - towards the central sectors of the basin in Sicily and Malta (RELINI, 2009; FROGLIA, 2010; MYTILINEOU *et al.*, 2016; DEIDUN *et al.*, 2017), and is currently expanding northwards in apparently colder latitudes. It is worth noting that GBIF includes a report of the species made by citizens in Calabria in 2019. Thus, the present record of *O. cursor* from Salento, made in September 2018, is the first one for the marine area n. 6 (Ionian Sea) of Italian marine fauna (see RELINI, 2010, for the biogeographic division of Italian seas).

In conclusion, it is necessary a thorough assessment of the actual distribution of *Ocypode cursor* in the Salento Peninsula, on the Ionian as well on the Adriatic coasts, as both are characterized by potentially suitable beach habitats. In addition, there is also a need for estimations of population parameters and of general morphometric features in relation with anthropogenic pressures, as the species represents a good indicator of the environmental status of beach habitats (DEIDUN *et al.* 2017). The approach constitutes a valid tool for understanding the magnitude of impacts experienced by the species and, thus, devising long-term conservation strategies.

To complement the monitoring, it would be appropriate to carry out studies on interspecific interactions with native fauna to assess, for example, significant negative interactions with protected species using the beach habitat for nesting such as sea turtles and avifauna. This will allow the implementation of effective actions of protection and conservation.

REFERENCES

- CHARTOSIA, N., KITSOS, M.S., TZOMOS, T., MAVROMATI, E., KOUKOURAS, A., 2010. Diet composition of five species of crabs (Decapoda, Brachyura) that show a gradual transition from marine to terrestrial life. *Crustaceana* **83**, 1181-1197.
- DEIDUN, A., CROCCETTA, F., SCIBERRAS, A., SCIBERRAS, J., INSACCO, G., ZAVA, B., 2017. The protected taxon *Ocypode cursor* (Linnaeus, 1758) (Crustacea: Decapoda: Ocypodidae) - documenting its well-established presence in the central Mediterranean. *European Zoological Journal* **84**, 96-103.
- DENMON, P., WATTS, B.D., SMITH, F.M., 2013. Investigating American oystercatcher (*Haematopus palliatus*) nest failure on Fisherman Island National Wildlife Refuge, Virginia, USA. *Waterbirds* **36**, 156-165.
- EC, 1982. Council of Europe - *Convention on the Conservation of European Wildlife and Natural Habitats* 1284 UNTS 209., Bern, p. 24.
- FROGLIA, C., 2010. Crustacea, Malacostraca, Decapoda. *Biologia Marina Mediterranea* **17**, 519-534.
- GLAUBRECHT, M., 1992. On the chronology of the horseman crab *Ocypode cursor* (Linnaeus 1758) in Eastern Mediterranean and the first evidence in SW-Anatolia. *Zool. Jahrb. Jahr. Syst.* **119**, 563-567.

- GÜL, M.R., GRIFFEN, B.D., 2019. Impacts of human disturbance on ghost crab burrow morphology and distribution on sandy shores. *PLoS ONE* **13**, e0209977.
- KARAA, S., JRIJER, J., BRADAI, M.N., JRIBI, I., 2019. New record of *Ocypode cursor* (Linnaeus, 1758)(Crustacea: Decapoda: Ocypodidae) from the Tunisian coasts, the central Mediterranean Sea. *Journal Black Sea/Mediterranean Environment* **25**, 101-107.
- KWON, E., FRASER, J.D., CATLIN, D.H., KARPANTY, S.M., WEITHMAN, C.E., MUIZNIKES, B., 2018. Presence of ghost crabs and piping plover nesting success. *The Journal of Wildlife Management* **82**, 850-856.
- LUCREZI, S., SCHLACHER, T.A., 2010. Impacts of off-road vehicles (ORVs) on burrow architecture of ghost crabs (Genus *Ocypode*) on sandy beaches. *Environmental Management* **45**, 1352-1362.
- MARCO, A., DA GRAÇA, J., GARCÍA-CERDÁ, R., ABELLA, E., FREITAS, R., 2015. Patterns and intensity of ghost crab predation on the nests of an important endangered loggerhead turtle population. *Journal of Experimental Marine Biology and Ecology* **468**, 74-82.
- MYTILINEOU, C., AKEL, E.H.K., BABALI, N., BALISTRERI, P., BARICHE, M., BOYACI, Y.Ö., CILENTI, L., CONSTANTINOU, C., CROCCETTA, F., ÇELİK, M., DERELI, H., DOUNAS, C., DURUCAN, F., GARRIDO, A., GEROVASILEIOU, V., KAPIRIS, K., KEBAPCIOGLU, T., KLEITOU, P., KRYSALAS, A., LIPEJ, L., MAINA, I., MARAKIS, P., MAVRIČ, B., MOUSSA, R., PEÑA RIVAS, L., POURSANIDIS, D., RENDA, W., RIZKALLA, S., ROSSO, A., SCIROCCO, T., SCIUTO, F., SERVELLO, G., TIRALONGO, F., YAPICI, S., ZENETOS, A., 2016. New mediterranean biodiversity records (November, 2016). *Mediterranean Marine Science* **17**, 794-821.
- RELINI, G., 2009. *Ocypode cursor* in Sicilia. *Notiziario S.I.B.M.* **56**, 49.
- RELINI, G. (ed.) 2008-2010. Check list della Flora e della Fauna dei Mari Italiani. *Biologia Marina Mediterranea*, 15 (suppl. 1), 17 (suppl. 1), 828 pages + indices
- SABINE, J.B., Schweitzer, S.H., Meyers, J.M., 2006. Nest fate and productivity of American oystercatchers, Cumberland Island National Seashore, Georgia. *Waterbirds* **29**, 308-314.
- SCHLACHER, T.A., LUCREZI, S., 2014. The Ecology of Ghost Crabs. *Oceanography Marine Biology Annual Review* **52**, 201-256.
- SCHLACHER, T.A., LUCREZI, S., CONNOLLY, R.M., PETERSON, C.H., GILBY, B.L., MASLO, B., OLDS, A.D., WALKER, S.J., LEON, J.X., HUIJBERS, C.M., WESTON, M.A., TURRA, A., HYNDES, G.A., HOLT, R.A., SCHOEMAN, D.S., 2016. Human threats to sandy beaches: a meta-analysis of ghost crabs illustrates global anthropogenic impacts. *Estuarine Coastal Shelf Science* **169**, 56-73.
- SILVA, W.T.A.F., CALADO, T.C.S., 2013. Number of ghost crab burrows does not correspond to population size. *Central Europe Journal of Biology* **8**, 843-847.
- STRACHAN, P.H., SMITH, R.C., HAMILTON, D.A.B., TAYLOR, A.C., ATKINSON, R.J.A., 1999. Studies on the ecology and behaviour of the ghost crab, *Ocypode cursor* (L.) in northern Cyprus. *Scientia Marina* **63**, 51-60.
- TÜRELI, C., YEŞİLYURT, I.N., AKAMCA, E., ERDEM, U., 2014. Distribution and Population density of the Ghost crab, *Ocypode cursor* (Linnaeus, 1758) in Yumurtalik beach, Turkey. *Asian Journal of Agricultural Biology* **2**, 59-66.

- UNEP, 1976. *Mediterranean Action Plan and the Final Act of the Conference of Plenipotentiaries of the Coastal States of the Mediterranean Region for the Protection of the Mediterranean Sea*, Barcelona, 2-16 February 1976.
- WARBURG, M.R., SHUCHMAN, E., 1979. Experimental studies on burrowing *Ocypode cursor* (L.) (Crustacea: Ocypodidae), in response to sand moisture. *Marine Behavioural Physiology* **6**, 147-156.
- WOLCOTT, D.L., WOLCOTT, T.G., 1999. High mortality of piping plovers on beaches with abundant ghost crabs: correlation, not causation. *Wilson Bulletin* **111**, 321-329.
- ZAFARANA, M.A., NARDO, A., 2016. Sulla presenza del granchio fantasma *Ocypode cursor* (L.) (Malacostraca Decapoda Ocypodidae) nel litorale sabbioso del Golfo di Gela. *Naturalista Siciliano* **4**, 329-333.

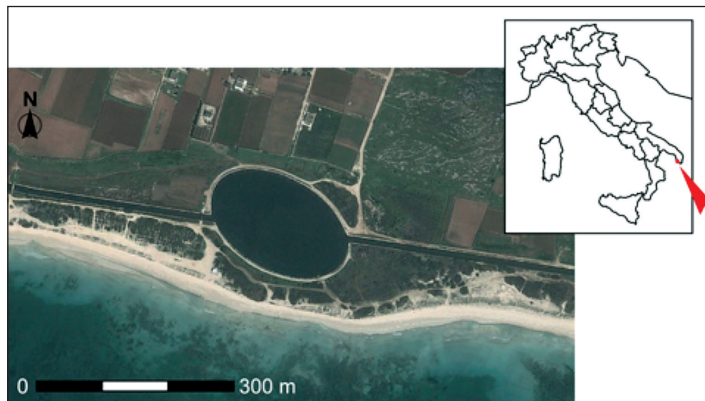


Fig. 1. Location of Torre Pali beach in the Salento Peninsula (SE Italy). Aerial orthophoto extracted from © Google Earth, accessed April 2019.



Fig. 2. Male *Ocypode cursor* captured during the census.

