

Title: Initiating the DNA barcoding of the Levant's marine biodiversity

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Biodiversity in the oceans was recently estimated at just about 393,000 metazoan species, belonging to 31 phyla, of which only half have been identified so far. Yet it seems that the true number of marine species and their correct identification will never be known, because of Humanity's limited access to large parts of the oceans' depths, the unprecedented species extinction occurring in recent decades the biological introduction rates that may outpace discovery, and the fact that cryptic species, sub-species and closely-related taxa reduce the capacity to monitor the full diversity repertoires presented by aquatic multicellular organisms. The anthropogenic impacts on the marine environments and the changes that follow, primarily at the continental shelf, further highlight the urgent need for accurate, fast and effective documentation of marine biodiversity, whereas at the same time the number of morphological taxonomists decline and hence limits our ability to keep up with identifying species, describing new species and studying their evolutionary and biogeography connections. The Mediterranean Sea is a hot spot for bioinvasion and more than 500 alien species of fish, invertebrates and algae have already been sighted, particularly in the Levant and along the Mediterranean coast of Israel, where more than 335 alien species have been reported - most of which came from the Red Sea through the Suez Canal. Although there is no doubt that the number of foreign species is even higher, we do not have effective tools for investigating this troublesome situation.

Following the understanding that classical taxonomic tools are able to identify only a fraction of the existing biodiversity, a decade of using the mitochondrial (COI) and the Rubisco genes (RBCL) as molecular barcodes for the identification of fauna and flora, respectively, along with a number of prominent studies, revolutionized taxonomy by creating the global web for barcoding terrestrial biota, and the marine barcoding shortly afterwards. Based on this global initiative and in view of the anticipated global changes and accelerated environmental development in the Western Mediterranean, two years ago we started to establish the scientific infrastructure for barcoding the Israeli Levantine marine biodiversity, , a gambit for long-term barcoding research. We rely on the knowledge and skills of available taxonomists, on innovative molecular methods based on specific DNA sequences and on a connection with Global BoLD database. So far, we have identified and uploaded to the BoLD international database 388 marine species, 336 of which are fish, 29 crustaceans and 21 mollusks, all with museum voucher tags. At a later stage, we will upload to the database algae species and other invertebrates, collected from the littoral, the continental shelf, and the Levant's deep sea. The database will be open to scientists, students and to the general public. A database center, currently constructed at Israel Oceanographic and Limnological Research, will enable access to all data, including images, DNA sequences, locations of sampling and other morphological characters.