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Review

Humusica 2, article 10: Histic humus systems and forms – Key of classification☆

Augusto Zanella[a,*], Rein De Waal[b], Bas Van Delft[b], Jean-François Ponge[c], Chiara Ferronato[d], Maria De Nobili[e], Renée-Claire Le Bayon[f], Anna Andreetta[g], Raimo Kõlli[h]

[a] University of Padua, Italy
[b] University of Wageningen, The Netherlands
[c] Muséum National d'Histoire Naturelle, Paris, France
[d] University of Bologna, Bologna, Italy
[e] University of Udine, Udine, Italy
[f] University of Neuchâtel, Switzerland
[g] University of Firenze, Italy
[h] Institute of Agricultural & Environmental Sciences, Tartu, Estonia

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ABSTRACT

This paper corresponds to an illustrated field key of classification of Histic humipedon. Vocabulary and diagnostic horizon definitions are in Humusica 2, article 9. The process of classification can follow a step by step way or simply be realised choosing the right diagnostic horizon on a table and composing the whole profile as in a game of construction. Examples of real profiles are given for comparison with the ones people can find in the field.

1. Introduction

Humusica recovers keys of classification published in preceding works (Jabiol et al., 2013; Zanella et al., 2011, 2009). Here, we have introduced important improvements at the level of vocabulary, precising terms and diagnostic horizons. The gradual shift from Histic systems to Terrestrial systems on one side and to Submersed systems on the other (Humusica 2, Article 12), gives more functionality and practical value to the whole classification. We distinguished fens from bogs. Fens are generally covered by grasses and sedges. They have greater water exchange (oxygenated water) and a water richer in nutrients coming rather from small streams and groundwater. Bogs are usually acid systems, covered with *Sphagnum* sp. of peat mosses. Their oxygen content in water is very low (hypoxia) and water mainly comes rather from rain and snow. Less known is the subdivision between large and small systems, as illustrated in Fig. 1. Both distinctions, fens and bogs on one side, large and small systems on the other, interfere and generate the Histic humus systems we enumerate here down. Please refer to specialized publications for investigations about the processes of formation of these soils, some among many (Bock and Köthe, 2008; Boixadera et al., 2003; Christiansen et al., 2012; Clarke et al., 2003; Curmi et al., 1998, 1993; Ferronato et al., 2016; Hong et al., 2016; Hussain and Swindale, 1970; Jungkunst et al., 2008; Jungkunst and Fiedler, 2007; Kögel-Knabner et al., 2010; Kolli, 2011; Kraus and Aslan, 1993; Kust, 1995; Lange et al., 2011; Licht et al., 2014; Loustau and Toutain, 1987; Mafra et al., 2007; Munch and Ottow, 1983; Nawaz et al., 2014; Ottow and Munch, 1978; Rashid and Schaefer, 1985; Rawls et al., 2003; Spohn et al., 2016; Targulian and Krasilnikov, 2007; Trebitz et al., 2005; Vicca et al., 2009; Vittori Antisari et al., 2016; Well et al., 2003; Winkler et al., 2016), for more detailed field descriptions and soil parameters surveys, or present time challenges involving submersed soils, among many works (Adhikari and Hartemink, 2016; Balks and Zabowski, 2016; Batjes, 2014; Bou Kheir et al., 2010; Canarache et al., 2006; Chaplot et al., 2003, 2001; Heinemeyer et al., 2010; Jahn et al., 2006; Kolay, 2007; Kutílek and Nielsen, 2015; Malone et al., 2017; Mishra and Kuhlman, 2013; Nieveen et al., 2005; Parsekian et al., 2012; Rudiyanto et al., 2016; Soil Science Division Staff, 2017; Stockmann et al., 2013, 2016; Zhang et al., 2016).

☆ Background music while reading: My Top 20 Blind Auditions – The Voice of China (中国好声音): https://www.youtube.com/watch?v=lTQX1oPHw_g.

* Corresponding author.
E-mail addresses: augusto.zanella@unipd.it (A. Zanella), rein.dewaal@wur.nl (R. De Waal), bas.vandelft@wur.nl (B. Van Delft), ponge@mnhn.fr (J.-F. Ponge), chiara.ferronato2@unibo.it (C. Ferronato), maria.denobili@uniud.it (M. De Nobili), claire.lebayon@unine.ch (R.-C. Le Bayon), anna.andreetta@unifi.it (A. Andreetta), raimo.kolli@emu.ee (R. Kõlli).

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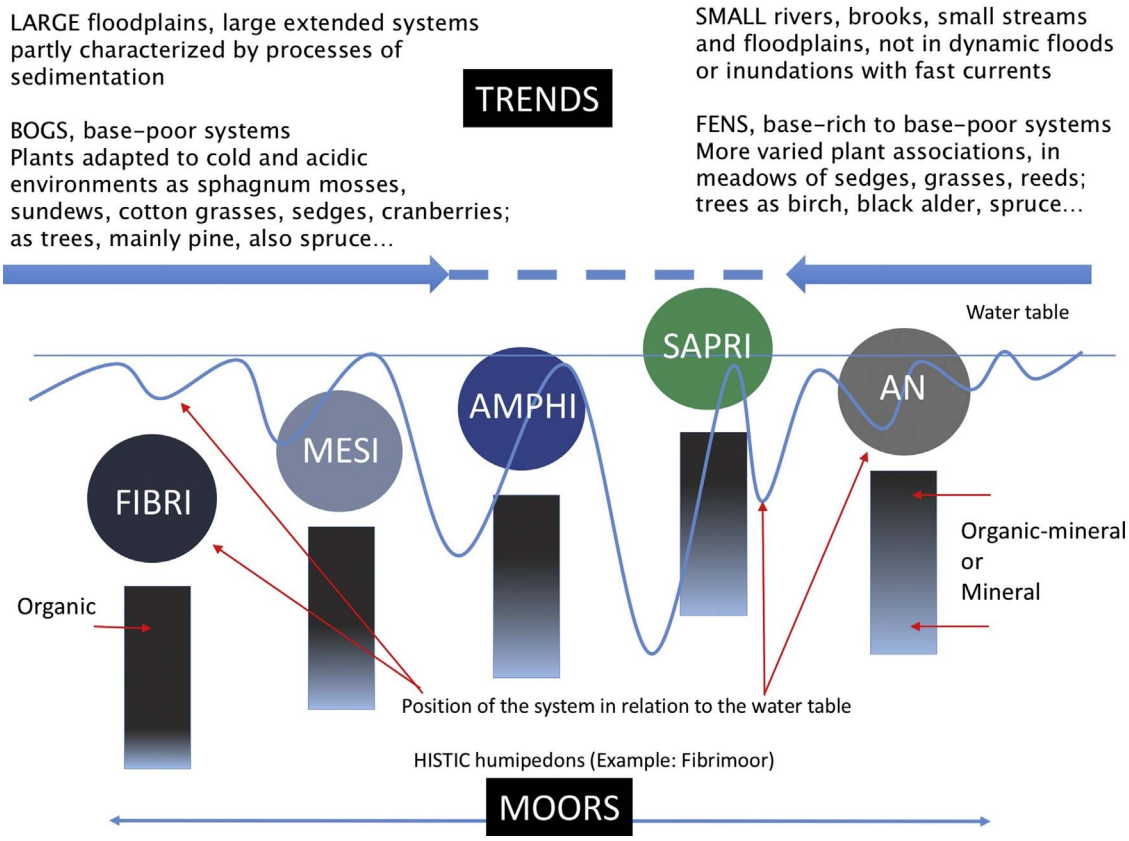

Fig. 1. Large or small systems of submerged humipedons. The water table also interferes and generally has a larger fluctuation at the level of Amphimoor and Saprimoor systems (prepared by De Waal R., Zanella A., Ponge J.F. and Kõlli R.).

2. General features and distribution of the histic humus systems

2.1. General features and distribution of Anmoor

- Ecological conditions: wet base-rich soils or soils enriched through base-rich groundwater in brook valley systems (small rivers, brooks, small streams and floodplains, not in dynamic floods or inundations with fast currents); temperate climate and/or non-acid siliceous, or calcareous parent material and/or easily biodegradable litter (C/N < 30) and/or no major environmental constraint;
- Dominant actors of organic matter biodegradation: anaerobic bacteria, anecic and large endogeic earthworms;
- Actors action: fast litter decomposition and incorporation in the upper soil layers and consequent disappearance of litter from the topsoil (≤3 years), potential carbon stockes in the A horizon;
- pHwater of the A horizon: generally ≥5;
- Key diagnostic features (morpho-functional result of specific biological activities): H never presents, anA muddy or biomacrostructured in very dried period of the year, sharp transition (< 3 mm) between organic and organo-mineral horizons.

2.2. General features and distribution of Saprimoor

- Ecological conditions: moist base-rich soils in brook valley systems and fens (large floodplains, large extended systems partly characterized by processes of sedimentation) and drained fens in floodplains and dynamic brook valleys; mild to moderately cold climate, generally not in acid water conditions;
- Dominant actors of biodegradation: enchytraeids, collembolans and epigeic earthworms; fungi;
- Actors action: slow biodegradation (2–7 years), carbon stocked in both organic and organo-mineral horizons;
- pHwater of the A horizon: generally > 5;
- Key diagnostic features: HF or HM never present, nozHS possible and even dominant in some cases, anA possible in concomitance with lHS.

2.3. General features and distribution of Amphimoor

- Ecological conditions: moderately moist base-poor soils in brook valley systems or base-rich soils in half-drained fens and eutrophic or desiccated fens with growing influence of stagnating rainwater; contrasting climate conditions (dry summer, rainy autumn), generally in acidocline water, with growing influence in desiccated fens;
- Dominant actors of biodegradation: enchytraeids, collembolans, mites and earthworms; fungi;
- Actors action: slow biodegradation (2–7 years), high carbon content in both organic and organo-mineral horizons;
- pHwater of the A horizon: generally < 5;
- Key diagnostic features (morpho-functional result of specific biological activities): HS always present, plus HM or HF following the increasing acidity of the water.

2.4. General features and distribution of Mesimoor

- Ecological conditions: wet moderately base-poor soils in brook valley systems, or base-enriched soils of drained, previously base-poor bogs, bogs in floodplains and brook valleys fed by surface or mesotrophic groundwater (not dynamic); base poor soils filled by acid to mesotrophic water;
- Dominant actors of biodegradation: enchytraeids, collembolan, mites and epigeic earthworms; fungi;
- Actors action: very slow biodegradation (> 7 years), carbon stocked in organic horizons;