**Anomalous Tree Bioelectric Potential measured at 3 observation posts prior to '03.09.26 Hokkaido Tokachi offshore Earthquake in Japan**

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## 1. Introduction

Since 1977 Tree Bioelectric Potential (TBP) has been measured at Suginami Tokyo, preceding earthquakes of magnitude 5 or above, anomalous potential changes were often observed. At three observation posts (Sapporo Hokkaido, Suginami Tokyo and Sagamihara Kanagawa) anomalous phenomena on TBP appeared prior to 2003/09/26 Hokkaido Tokachi offshore earthquake (M=8.0).

## 2. Measuring System

The system used to measure the TBP is shown in Fig.1. A silver electrode (diameter: 0.5mm, length: 50mm) is inserted into living tissue of the tree and another silver electrode (diameter: 0.5mm, length: 100mm) is buried at a depth of 1m into the ground at a point 1 or 1.5m from the tree. Both electrodes are connected with shielding wires to input terminals of a chart recorder. With this circuit, it is possible to observe the TBP under the influence of earth currents (TORIYAMA, 1994). TBP is measured by digital system composed of A/D (Analogue to Digital) Converter and Personal Computer instead of Chart Recorder at Sagamihara observation post.

## 3. Precursory phenomena at three observation posts

At Sapporo observation post located at about 270km from the epicenter, the TBP is measured by using a silk tree (*Albizzia Julibrissin*, NEMUNOKI) which had been growing and reached at the age of about 20 years in a field of house yard. TBP data was normal pattern till '03/07/31. Impulsive signal with potential of approx. –5mV appeared during '03/08/01 and '03/08/09. These impulsive signals may be caused by micro clucks. After '03/08/10 to '03/08/11 the noise base line raised up towards minus potential day by day. After '03/08/12 to '03/08/28 TBP observed data was exceeded and kept at more than –100mV. During '03/08/29 and '03/09/02 anomalous pattern like saw-tooth with 10mVp-p (peak to peak) appeared. The peak to peak value and frequency of appearance reduced towards '03/09/02. After '03/09/03 observed data became normal pattern.

At Suginami observation post located at about 780km from the epicenter, the TBP is measured by using a *Ulmus Keaki tree* (KEYAKI) which had been growing and reached at the age of about 40 years in a field of house yard. The TBP data was normal pattern till '03/09/03. Anomalous signal like saw-tooth was observed on '03/09/04 to 09/05. Peak voltage was almost +50mV.

At Sagamihara observation post located at about 800km from the epicenter, the TBP is measured by using a *Osmanthus Fragnans* tree (KIN-MOKUSEI) which had been growing and had reached at the age of 13 years in a field of house yard. Impulsive signal with potential of approx. –10mV appeared on '03/09/22 and 09/23. 5-hours slow charging curve with –5.5mV peak voltage appeared on '03/09/24. Since about 12 hours before the main shock, observed TBP data returned to normal and impulsive signal appeared often after '03/09/27. Those impulsive signals were assumed to correspond to after shocks.

## 4. Conclusions

Although observed anomaly at 3 observation posts were not synchronous, proceeding period probably depends on distance from the epicenter and also kind and age of tree. At Sagamihara observation post minus TBP anomalous data corresponds to big earthquakes occurred in northern part of Japan and plus

TBP anomalous data corresponds to big earthquakes occurred in south KANTO area or IZU islands. The TBP anomalous signal provably corresponds to earthquakes with magnitude of more than 5. The authors strongly emphasize the importance of parallel measurement of TBP and other Seismic Electro-Magnetic Signal (SEMS). Thus the performance of a long-term observation of the TBP which would cover wide area of Japan is deemed advisable, if we could observe SEMS in multiple methods at plural points, we may contribute to the earthquake prediction.

## References

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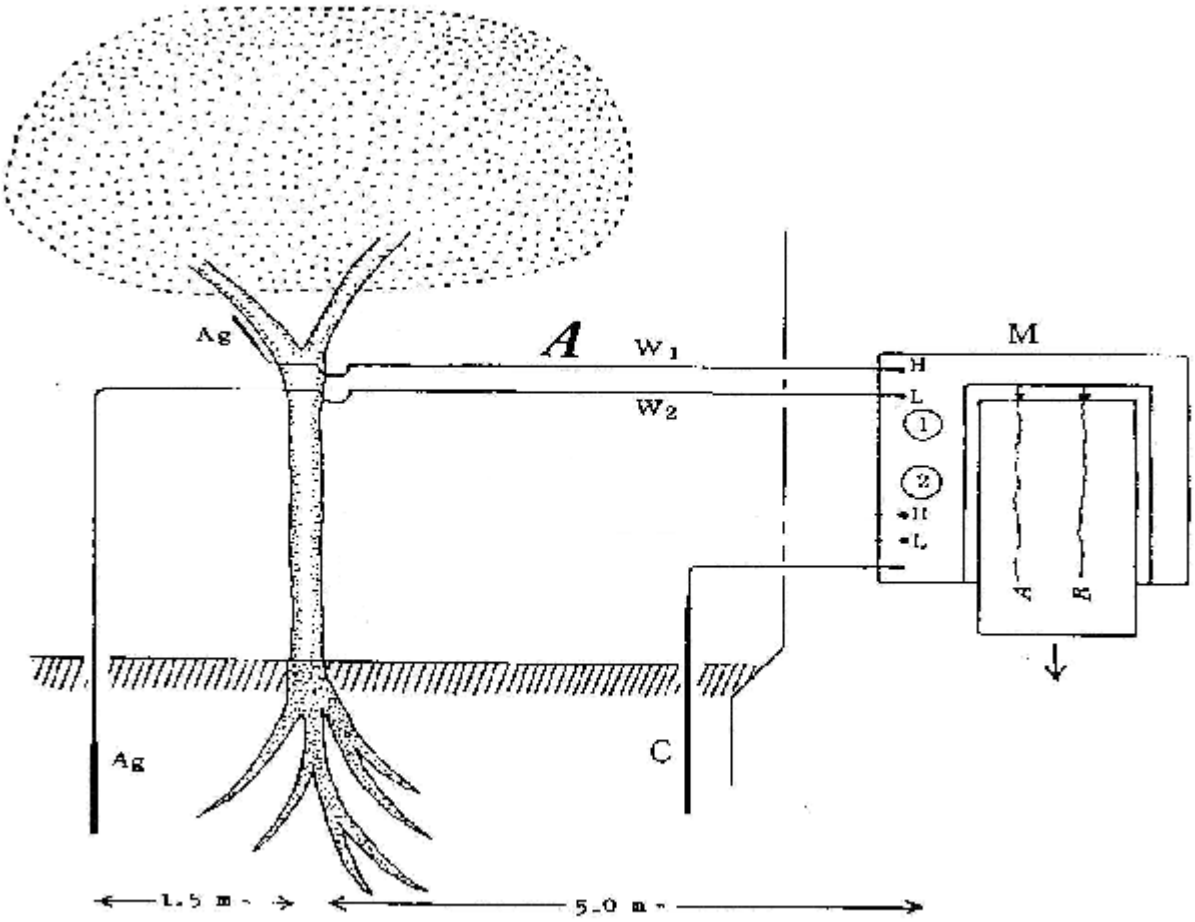


Fig.-1 Measuring System